

PROPOSED PLAN CHANGE

Cambridge Road | Te Awamutu | Waipa
Transportation Assessment

Prepared For
638 Limited

Date of Issue
September 2025



Contents

1. Introduction	1
2. Assessment Methodology.....	2
3. The Existing Transport Environment	3
3.1 Crash History	3
3.2 Traffic Surveys	3
3.2.1 Thursday AM Peak (0815-0915).....	4
3.2.2 Thursday PM Peak (1630-1730)	5
3.2.3 Saturday Peak (1015-1115).....	6
3.2.4 Pedestrian Movements.....	7
3.3 Traffic Growth.....	8
3.4 Area B – Traffic generation and Distribution	10
3.4.1 Total Movements – AM Peak	13
3.4.2 Total Movements – PM Peak.....	14
3.4.3 Total Movements – Saturday Peak	15
3.5 Road Improvement Options	16
3.5.1 Option 1 – Shared Path	16
3.5.2 Option 2- Access 1 Roundabout.....	22
3.5.3 Option 3 – Access 1 Traffic Signals	26
4. Request for Further Information (RFI)	32
5. Conclusions	33
5.1 Option 1	33
5.2 Option 2	33
5.3 Option 3	33
5.4 Recommended Option	33

Table of Figures

Figure 1: Proposed Plan Change Area	1
Figure 2: Area B- Potential Development.....	10
Figure 3: Option 1 – AM Peak – Access 1	17
Figure 4: Option 1 – AM Peak – Access 2	18
Figure 5: Option 1 – PM Peak – Access 1	18
Figure 6: Option 1- PM Peak- Access 2	19
Figure 7: Option 1 – Saturday Peak – Access 1.....	19
Figure 8: Option 1 – Saturday Peak – Access 2.....	20
Figure 9: Option 2 – AM Peak Access 1.....	23
Figure 10: Option 2 – AM Peak – Access 2	23
Figure 11: Option 2 – PM Peak – Access 1	24
Figure 12: Option 2 – PM Peak – Access 2	24
Figure 13: Option 2 – Saturday Peak – Access 1.....	25
Figure 14: Option 2 – Saturday Peak – Access 2.....	25
Figure 15: Option 3 – AM Peak – Access 1	27
Figure 16: Option 3 – AM Peak – Access 2	27
Figure 17: Option 3 – PM Peak – Access 1	28
Figure 18: Option 3 – PM Peak – Access 2	28
Figure 19: Option 3 – Saturday Peak – Access 1.....	29
Figure 20: Option 3 – Saturday Peak – Access 2.....	29
Figure 21: Option 3 – Access 1 – AM Peak – with 30% of Access 2 RT	30
Figure 22: Option 3 – Access 1- PM Peak – with 30% of Access 2 RT.....	31
Figure 23: Option 3 – Access 1- Saturday Peak – with 30% of Access 2 RT	31

List of Tables

No table of figures entries found.

Appendices

Appendix A	Option 1 – Shared Path
Appendix B	Option 2 – Roundabout
Appendix C	Option 3 – Traffic Signals
Appendix D	Traffic Distribution Diagrams

Quality Assurance & Version Management

Limitations:

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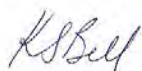
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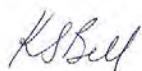


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Version Management

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1. Introduction

This report considers the traffic related aspects of a proposed Plan Change that comprises the existing commercial area on the southern side of Cambridge Road (referred to as Area A) and the adjacent land at 638 Cambridge Road (referred to as Area B).

Council has requested that consideration be given to the vehicle and pedestrian connections to the Plan Change area including the management of the existing and proposed vehicle connections to Cambridge Road and the pedestrian connections at these intersections, both across Cambridge Road and between the two parts of the plan change area.

The proposed plan change area is shown in the following concept plan. The site accesses are numbered for ease of reference.

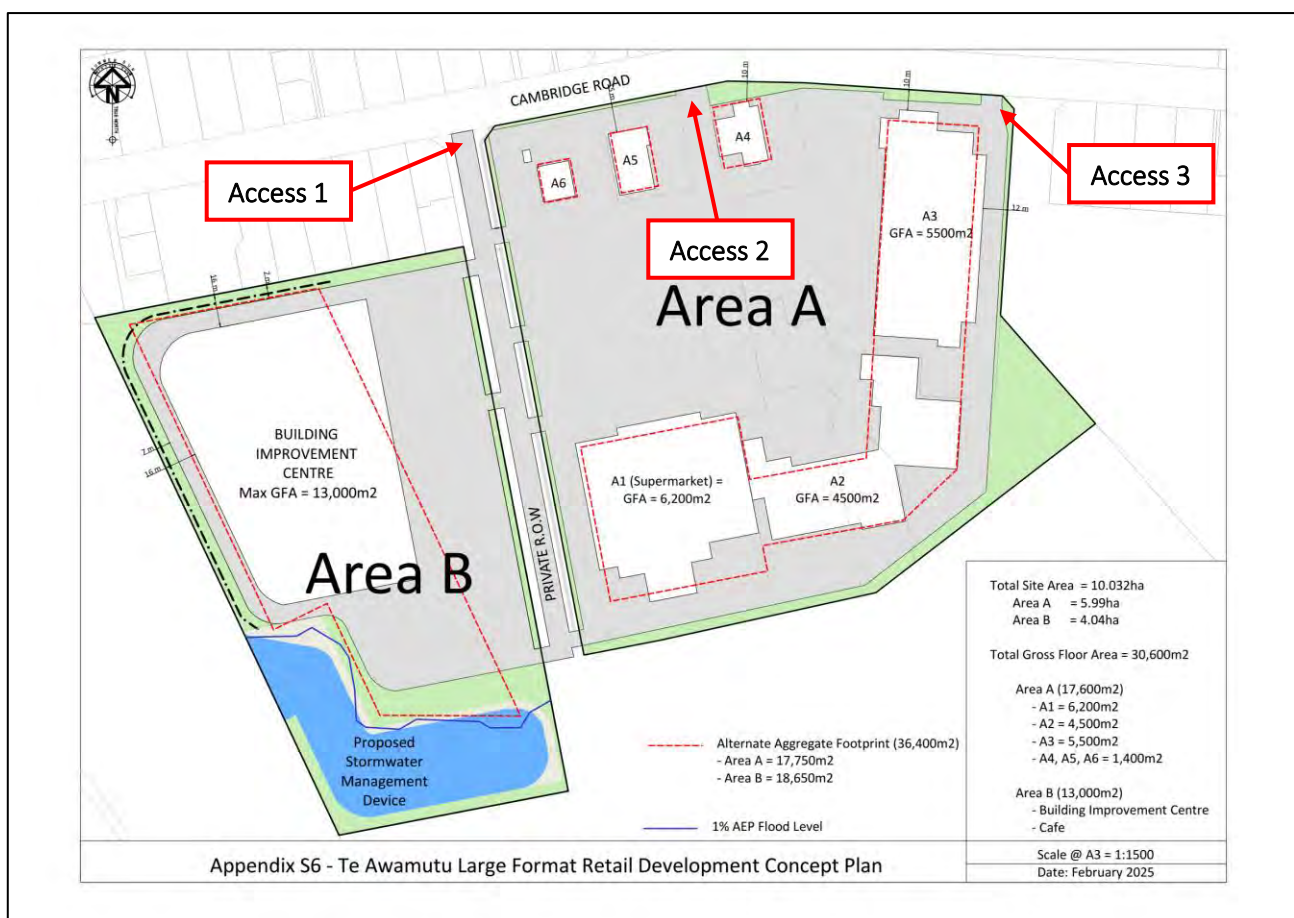


Figure 1: Proposed Plan Change Area

Area A currently consists of a number of commercial/retail tenancies, including the existing Mitre 10 store. Area B is vacant land, and the Plan Change seeks to establish a new Mitre 10 Mega store.

The existing Mitre 10 store located in Area A will remain as retail as presently enabled by the rules of the Waipa District Plan.

2. Assessment Methodology

This assessment considers the existing and future operation of Cambridge Road in the vicinity of the Plan Change area and in particular the vehicle connections to the site and the pedestrian amenity across these site accesses and Cambridge Road.

To determine the most appropriate access configurations and pedestrian amenity the following methodology has been followed.

- Research the crash history in the vicinity of the plan change area to determine if there are any existing safety issues.
- Determine the existing operation of the site accesses during the weekday peak periods and the Saturday peak period.
- Apply traffic growth to the through traffic movements on Cambridge Road to represent a 10-year horizon for modelling purposes.
- Calculate the likely traffic movements and distribution generated by the future development located within Area B.
- Distribute the additional traffic generated by the Area B development to the Area B access (Access 1).
- Given that the existing Mitre 10 development located in Area A will be replaced by a similar retail activity, the existing traffic movements at Access 2 have been assumed to remain unchanged.
- Consider a range of access configurations and pedestrian amenity.
- Prepare preliminary designs that show the spatial requirements for the identified options.
- Undertake 'Sidra Intersection' modelling for the weekday peak hours and Saturday peak period using the combined flows and distributions to determine the operation of each option.
- Provide an analysis of each option and recommendations.

3. The Existing Transport Environment

This section considers the following.

- Research the crash history in the vicinity of the plan change area to determine if there are any existing safety issues.
- Determine the existing operation of the site accesses during the weekday peak periods and the Saturday peak period.

3.1 Crash History

The crash record maintained by Waka Kotahi (NZTA) has been reviewed for the five-year period 2020 to 2024 inclusive. Also included in the search were the crashes that have been processed and were on file for 2025.

The searched area covered the section of Cambridge Road between Pekerau Crescent and Gleneagles Drive.

Two crashes were reported as occurring within the searched area for the given timeframe, with one being a minor-injury crash and the other being a non-injury crash.

- The non-injury crash involved a vehicle travelling eastbound and hitting a parked car. The driver was noted to be distracted by their mobile phone.
- One crash involved a car losing control as they exited the eastern public access of the site. It is noted that alcohol is recorded as a factor in this crash.

Both of these crashes are considered to be due to driver error and do not highlight any concerns with the existing configuration of the intersections.

3.2 Traffic Surveys

Traffic surveys were undertaken at the three vehicle connections to Cambridge Road (Access 1, 2 and 3). These surveys were undertaken on Thursday 18 May 2023 and on Saturday 20 May 2023.

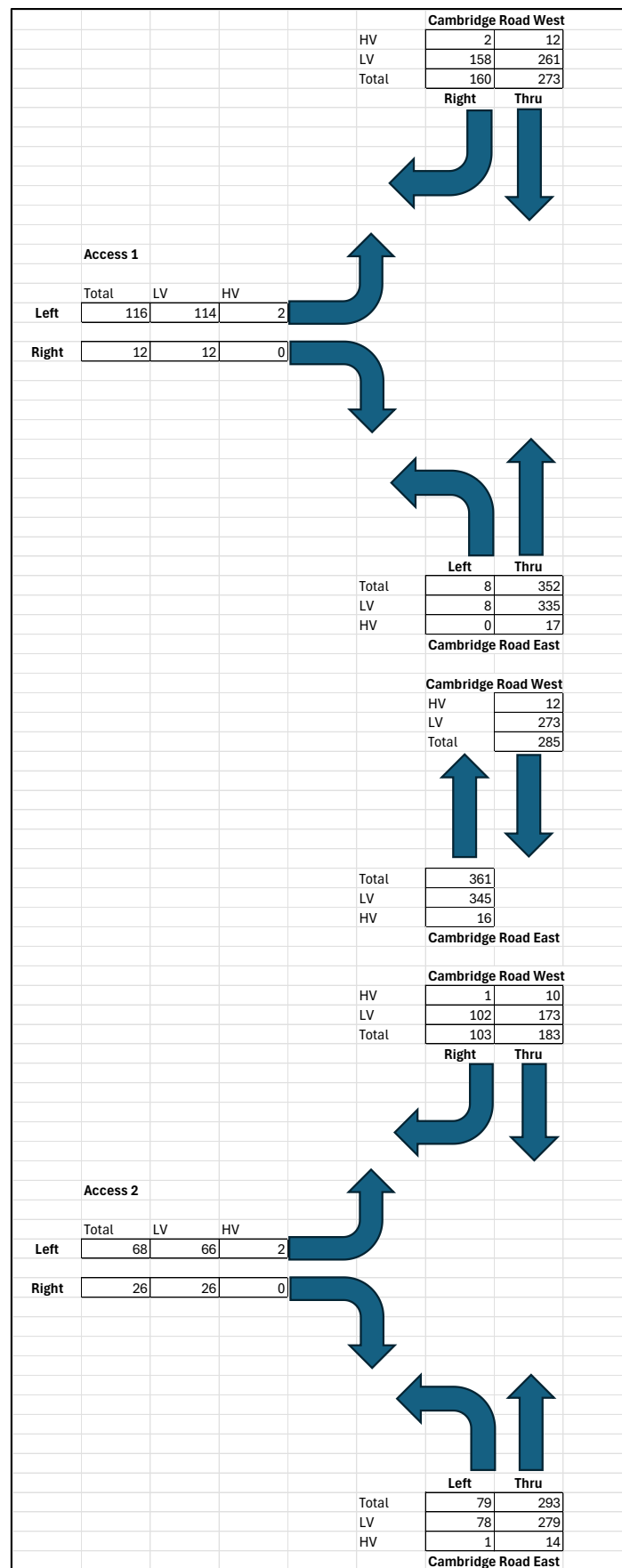
These surveys were repeated on Thursday 20 March 2025 and on Saturday 22 March 2025 to:

- Determine traffic growth on Cambridge Road.
- Provide contemporary data for the existing vehicle movements to and from the site.
- Provide pedestrian movement information.

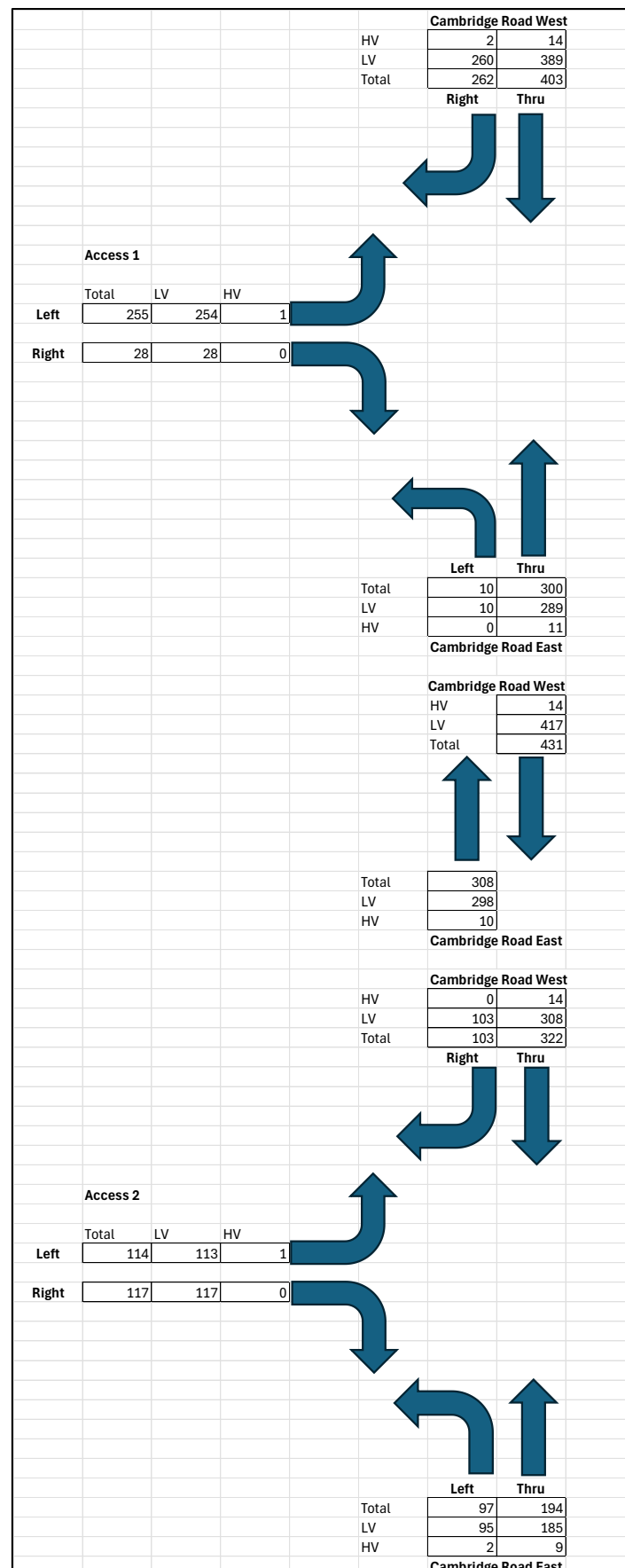
It is noted that the existing access to the loading area (access 3) was not resurveyed as its use is confined to truck movements which will remain unchanged.

For ease of reference the traffic counts undertaken in March 2025 are shown diagrammatically for each of the identified peak periods.

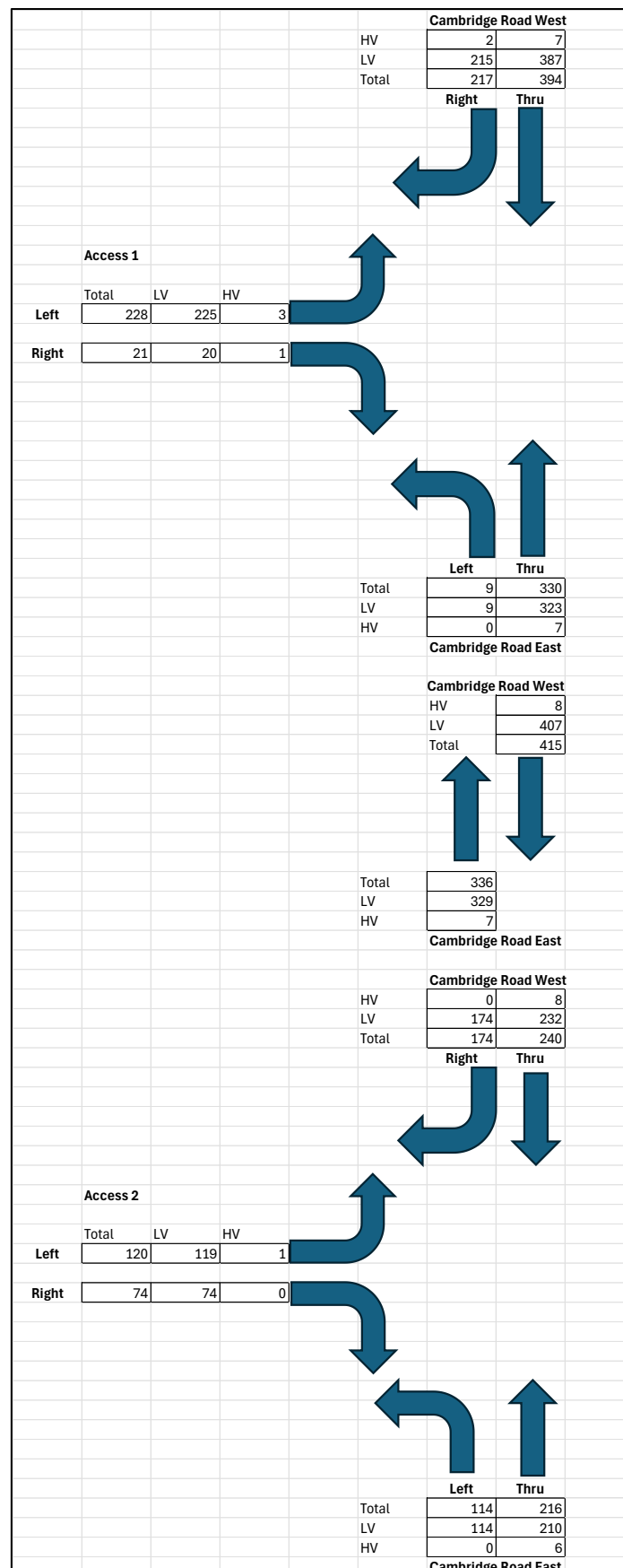
3.2.1 Thursday AM Peak (0815-0915)



3.2.2 Thursday PM Peak (1630-1730)



3.2.3 Saturday Peak (1015-1115)



To provide confidence that there were not unusual travel patterns on the surveyed days, a comparison has been made between the survey data and data collected by Council on the following week. The Council data was collected on Cambridge Road, to the west of the subject site (between Te Rahu Road and Pekerau Crescent).

It should be noted that the data used for this traffic assessment is made up of the highest four consecutive 15-minute periods, whereas the data provided by Council is in 60-minute intervals from the start of each hour.

AM Peak

Development Survey- Thursday 20 March 2025 (0815-0915): Eastbound 433 v/hr, Westbound 468 v/hr.

Council Survey- Thursday 27 March 2025 (0800-0900): Eastbound 430 v/hr, Westbound 562 v/hr.

PM Peak

Development Survey- Thursday 20 March 2025 (1630-1730): Eastbound 665 v/hr, Westbound 555 v/hr.

Council Survey- Thursday 27 March 2025 (1600-1700): Eastbound 620 v/hr, Westbound 568 v/hr.

Saturday Peak

Development Survey – Saturday 22 March 2025 (1015-1115): Eastbound 611 v/hr, Westbound 558 v/hr.

Council Survey- Saturday 29 March 2025 (1100-1200): Eastbound 568 v/hr, Westbound 549 v/hr.

As can be seen above the differences between the development surveys and the Council surveys are generally very small, with these differences being due to weekly fluctuations and slightly different time periods.

On this basis, there is confidence that the surveyed traffic data used is generally representative of the traffic patterns on Cambridge Road and that the differences in traffic numbers would have minimal effects on the modelling outcomes.

3.2.4 Pedestrian Movements

The surveys undertaken in March 2025 also surveyed the number of pedestrians and cyclists crossing each access and Cambridge Road in the vicinity of the accesses. This information is shown in the following table.

	Thursday (Crossing Cambridge Road)	Thursday (Crossing Access)	Saturday (Crossing Cambridge Road)	Saturday (Crossing Access)
Access 1 Pedestrians	40 pedestrians	69 pedestrians	19 pedestrians	22 pedestrians
Access 1 Cyclists	4 cyclists	3 cyclists	1 cyclist	3 cyclists
Access 2 Pedestrians	34 pedestrians	34 pedestrians	12 pedestrians	5 pedestrians
Access 2 Cyclists	3 cyclists	3 cyclists	1 cyclist	nil
Total (Cambridge Road)	81 peds/cyclists		33 peds/cyclists	

As can be seen above, there are significant numbers of pedestrians crossing Cambridge Road and walking along the southern side of Cambridge Road across the site accesses. These pedestrian movements occurred throughout both surveyed days. On this basis, all options for improving the local network will need to consider pedestrians.

3.3 Traffic Growth

This section considers the likely traffic growth and applies this anticipated growth to the through traffic movements on Cambridge Road to represent a 10-year horizon for modelling purposes.

Comparison of the 2023 and 2025 traffic surveys show the following differences in through traffic volumes on Cambridge Road.

The peak hours shown below are based on the highest hourly through traffic volumes on Cambridge Road calculated at 15-minute intervals.

The following vehicle movements were surveyed at Access 1.

	Thursday All Day (0700-1800)	Thursday AM Peak Hour (0815-0915)	Thursday PM Peak Hour (1630-1730)	Saturday (0800-1400)	Saturday Peak Hour (1015-1115)
Eastbound Thru 2023	3627 veh/day	320 veh/hour	412 veh/hour	1642 veh/day	337 veh/hour
Eastbound Thru 2025	3416 veh/day	285 veh/hour	417 veh/hour	1783 veh/day	402 veh/hour
Eastbound Change	Minus 211	Minus 35	Plus 5	Plus 141	Plus 65
Westbound Thru 2023	3716 veh/day	366 veh/hour	375 veh/hour	1661 veh/day	353 veh/hour
Westbound Thru 2025	3497 veh/day	369 veh/hour	311 veh/hour	1737 veh/day	338 veh/hour
Westbound Thru Change	Minus 219	Plus 3	Minus 64	Plus 76	Minus 15
Both Directions 2023	7343 veh/day	686 veh/hour	787 veh/hour	3303 veh/day	690 veh/hour
Both Directions 2025	6913 veh/day	654 veh/hour	728 veh/hour	3520 veh/day	740 veh/hour
Both Directions Change	Minus 430	Minus 32	Minus 49	Plus 218	Plus 50
% Change (22 months)	Minus 5.8%	Minus 4.7%	Minus 6.2%	Plus 6.2%	Plus 6.8%
% Change (annual)	Minus 3.2%	Minus 2.6%	Minus 3.4%	Plus 3.4%	Plus 3.7%

The following vehicle movements were surveyed at Access 2.

	Thursday All Day (0700-1800)	Thursday AM Peak Hour (0815-0915)	Thursday PM Peak Hour (1630-1730)	Saturday (0800-1400)	Saturday Peak Hour (1015-1115)
Eastbound Thru 2023	2392 veh/day	200 veh/hour	319 veh/hour	927 veh/day	175 veh/hour
Eastbound Thru 2025	2307 veh/day	193 veh/hour	336 veh/hour	1080 veh/day	249 veh/hour
Eastbound Change	Minus 85	Minus 7	Plus 17	Plus 153	Plus 74
Westbound Thru 2023	2547 veh/day	293 veh/hour	234 veh/hour	1017 veh/day	224 veh/hour
Westbound Thru 2025	2401 veh/day	307 veh/hour	203 veh/hour	1087 veh/day	222 veh/hour
Westbound Thru Change	Minus 146	Plus 14	Minus 31	Plus 70	Minus 2
Both Directions 2023	4939 veh/day	493 veh/hour	553 veh/hour	1944 veh/day	399 veh/hour
Both Directions 2025	4708 veh/day	500 veh/hour	539 veh/hour	2167 veh/day	471 veh/hour
Both Directions Change	Minus 231	Plus 7	Minus 14	Plus 223	Plus 72
% Change (22 months)	Minus 4.7%	Plus 1.4%	Minus 2.6%	Plus 10.2%	Plus 15%
% Change (annual)	Minus 2.5%	Plus 0.8%	Minus 1.4%	Plus 5.4%	Plus 7.9%

As can be seen above, the Cambridge Road through movements have decreased during the weekday and increased on Saturday. Given that the surveyed days were a snapshot of vehicle movements on the specific days surveyed, this comparison does not provide meaningful information in relation to anticipated traffic growth.

On this basis, discussions with the Transportation Manager at Waipa District Council have resulted in a growth rate of 40% being applied to the through movements on Cambridge Road for the purpose of this analysis.

Application of the 40% growth rate represents growth over a 20-year period and provides through traffic volumes on Cambridge Road that are expected to occur by 2045.

3.4 Area B – Traffic generation and Distribution

This section considers the following.

- Calculate the likely traffic movements and distribution generated by the future development located within Area B.
- Distribute the additional traffic generated by the Area B development to the Area B access (Access 1).
- Given that the existing Mitre 10 development located in Area A will be replaced by a similar large format retail activity, the existing traffic movements at Access 2 have been assumed to remain unchanged.

The proposed development of Area B is shown in the following Plan. This is a preliminary design and has only been referred to for traffic generation purposes.



Figure 2: Area B- Potential Development

To assess the potential traffic generation of Area B, reference has been made to traffic surveys undertaken at the Warkworth Mitre 10 Mega store during labour weekend 2022. The Warkworth store is recognised as a very popular store located in a developing area and provides a conservative basis for the estimation of traffic generation for Mitre 10 stores. This data is used to inform traffic generation for all new stores in New Zealand.

The results of the traffic surveys undertaken at the Warkworth store show the following traffic generation rates (per 100m²) when related to the gross floor area of circa 8,000m².

Labour Weekend

Thursday 20 October 2022 (0815-0915):

- Inbound: 0.92 trips/100m²
- Outbound: 0.72 trips/100m²
- Total: 1.64 trips/100m²
- HCV: 18%

Thursday 20 October 2022 (1630-1730):

- Inbound: 1.03 trips/100m²
- Outbound: 1.14 trips/100m²
- Total: 2.18 trips/100m²
- HCV: 3%

Saturday 22 October 2022 (1030-1130):

- Inbound: 2.24 trips/100m²
- Outbound: 2.26 trips/100m²
- Total: 4.50 trips/100m²
- HCV: 4%

Application of these rates to the proposed GFA of Area B (13,000m²) results in the following anticipated traffic generation for Area B. This approach is considered to provide a conservative assessment of traffic generation as it results in the traffic generation of the proposed store being approximately 160% of the Warkworth store.

Thursday AM Peak

- Inbound: $13,000\text{m}^2/100\text{m}^2 \times 0.92 = 120$ trips/hour (incl. 22 HCV)
- Outbound: $13,000\text{m}^2/100\text{m}^2 \times 0.72 = 94$ trips/hour (incl. 17 HCV)
- Total: $13,000\text{m}^2/100\text{m}^2 \times 1.64 = 214$ trips/hour (incl. 39 HCV)

Thursday PM Peak

- Inbound: $13,000\text{m}^2/100\text{m}^2 \times 1.03 = 134$ trips/hour (incl. 4 HCV)
- Outbound: $13,000\text{m}^2/100\text{m}^2 \times 1.14 = 148$ trips/hour (incl. 4 HCV)
- Total: $13,000\text{m}^2/100\text{m}^2 \times 2.17 = 282$ trips/hour (incl. 8 HCV)

Saturday Peak

- Inbound: $13,000\text{m}^2/100\text{m}^2 \times 2.24 = 291$ trips/hour (incl. 12 HCV)
- Outbound: $13,000\text{m}^2/100\text{m}^2 \times 2.26 = 294$ trips/hour (incl. 12 HCV)
- Total: $13,000\text{m}^2/100\text{m}^2 \times 4.50 = 585$ trips/hour (incl. 24 HCV)

These additional trips have been distributed to Access 1 using the surveyed distribution of movements that occurred at Access 2. This is because the existing movements at Access 2 are related to the existing Mitre 10 store and therefore are expected to have a similar profile to the proposed store.

The distribution of the additional turning movements at Access 1 for the three identified peak hours are:

Weekday AM Peak Hour – (0815-0915)

- Left turn in: 43% of inbound movements ($120 \times 43\% = 52$ veh/hr incl. 9 HCV)
- Right turn in: 57% of inbound movements ($120 \times 57\% = 68$ veh/hr incl. 13 HCV)
- Left turn out: 73% of outbound movements ($94 \times 73\% = 69$ veh/hr incl. 12 HCV)
- Right turn out: 27% of outbound movements ($94 \times 27\% = 25$ veh/hr incl. 5 HCV)

Weekday PM Peak Hour – (1630-1730)

- Left turn in: 49% of inbound movements ($134 \times 49\% = 66$ veh/hr incl. 2 HCV)
- Right turn in: 51% of inbound movements ($134 \times 51\% = 68$ veh/hr incl. 2 HCV)
- Left turn out: 50% of outbound movements ($148 \times 50\% = 124$ veh/hr incl. 2 HCV)
- Right turn out: 50% of outbound movements ($148 \times 50\% = 124$ veh/hr incl. 2 HCV)

Saturday Peak Hour – (1015-1115)

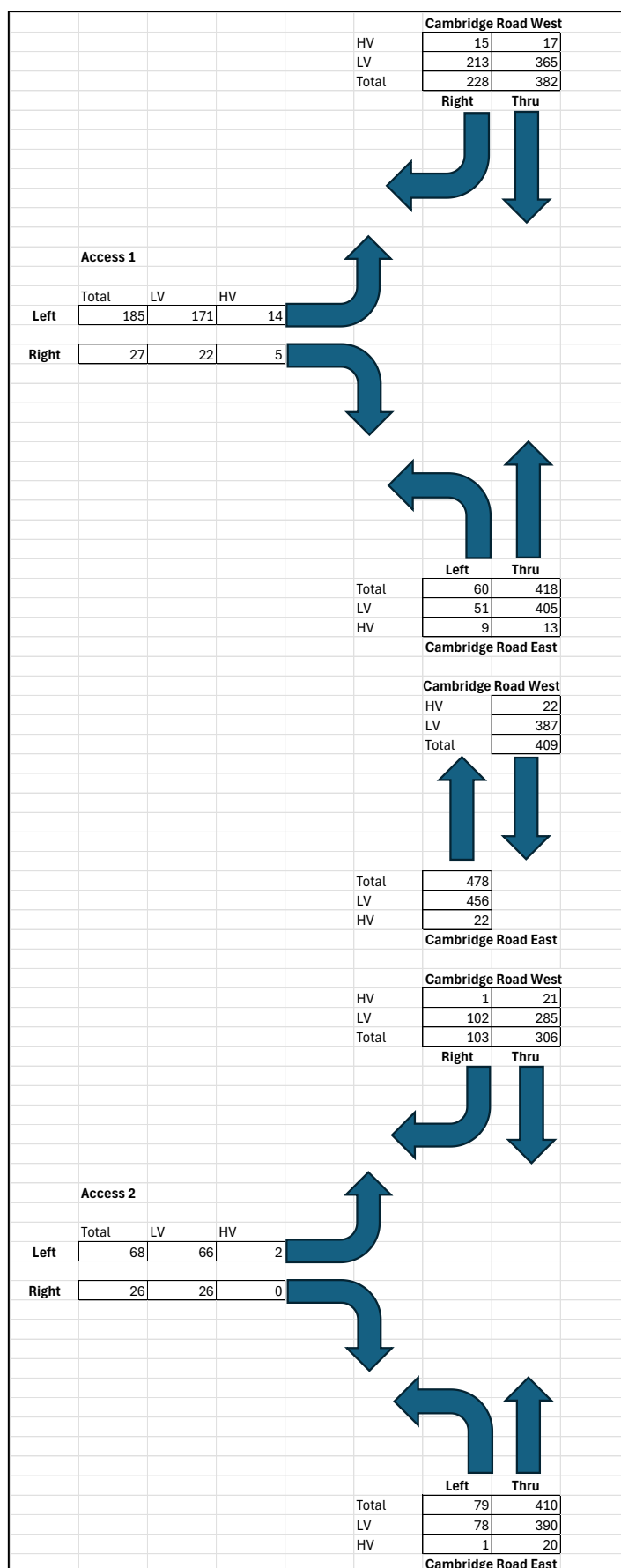
- Left turn in: 40% of inbound movements ($291 \times 40\% = 116$ veh/hr incl. 5 HCV)
- Right turn in: 60% of inbound movements ($291 \times 60\% = 175$ veh/hr incl. 7 HCV)
- Left turn out: 62% of outbound movements ($294 \times 62\% = 182$ veh/hr incl. 7 HCV)
- Right turn out: 38% of outbound movements ($294 \times 38\% = 112$ veh/hr incl. 5 HCV)

It should be noted that the peak hours for the store have been applied to the peak hours for all surveyed movements to provide an additional level of conservatism.

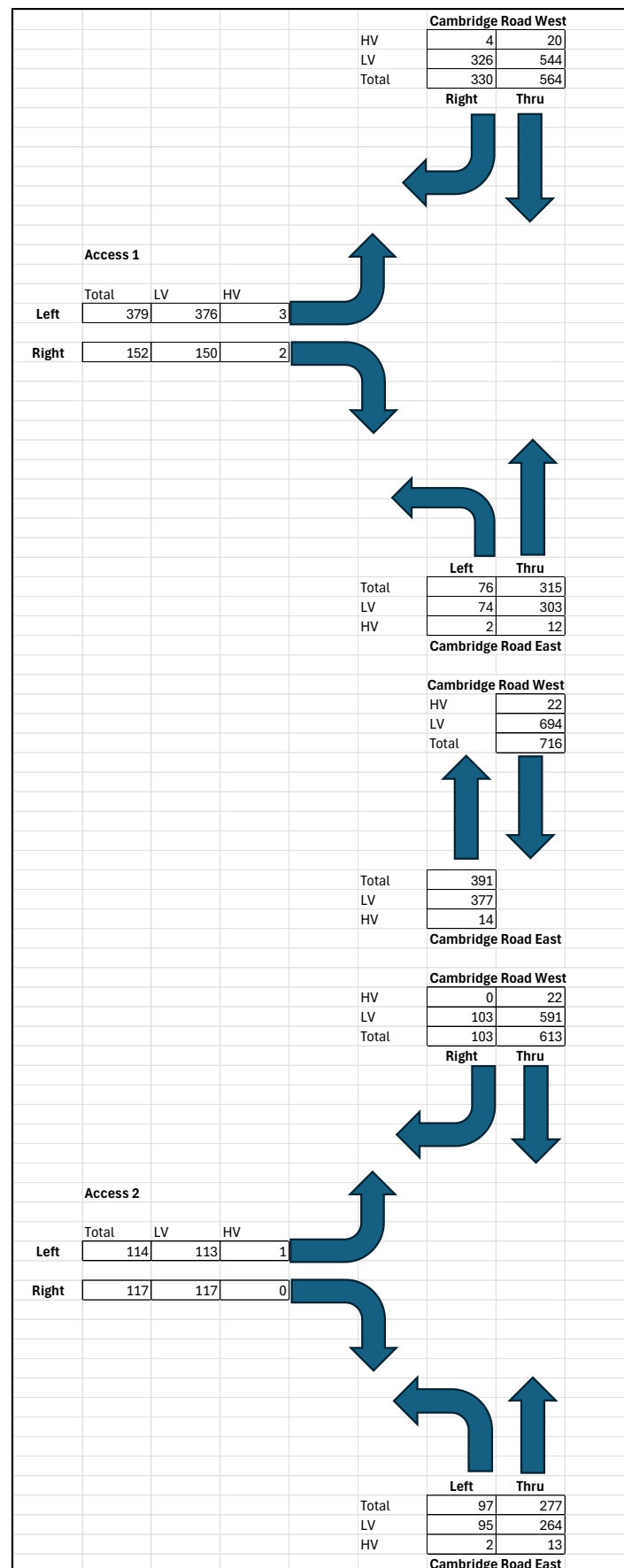
The growth factor for the through traffic on Cambridge Road has also been applied. These overall total traffic movements are used for modelling purposes and are shown diagrammatically for each of the identified peak periods.

For ease of reference a diagram showing the above steps is provided as an appendix for each peak period.

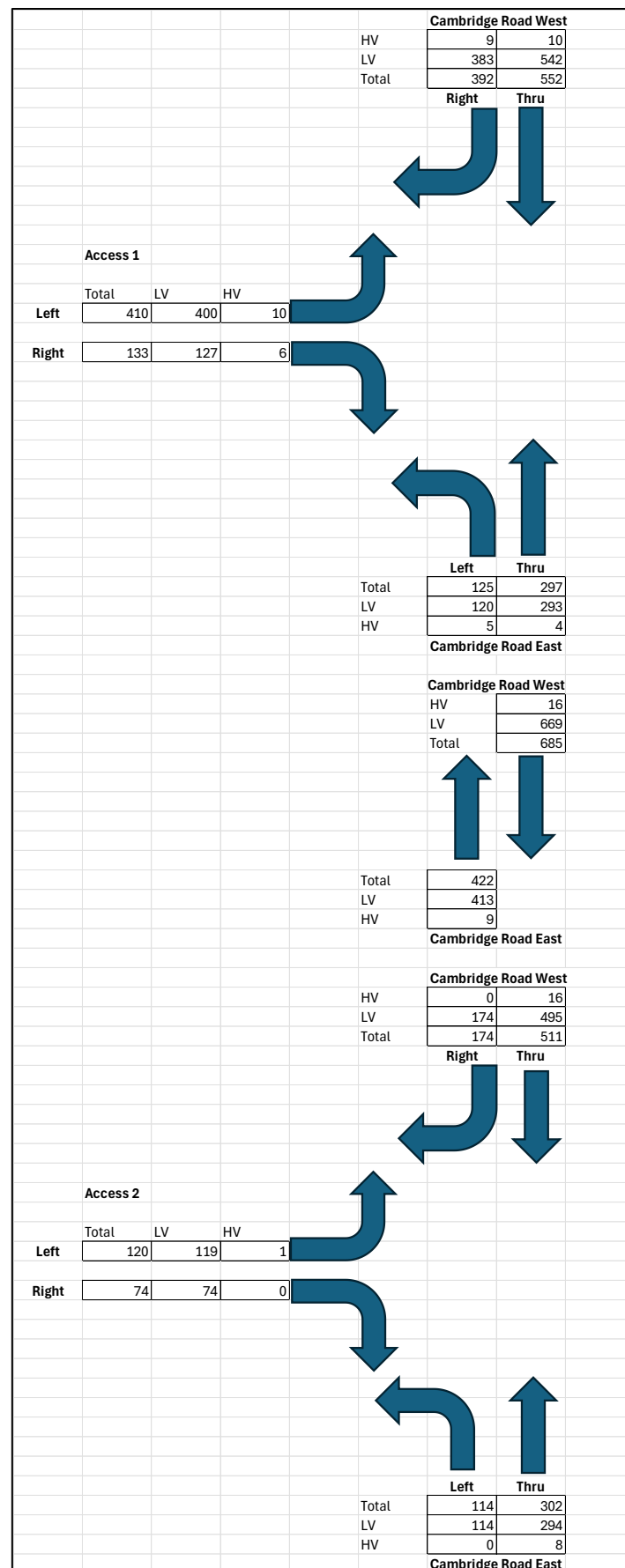
3.4.1 Total Movements – AM Peak



3.4.2 Total Movements – PM Peak



3.4.3 Total Movements – Saturday Peak



3.5 Road Improvement Options

Council has requested that consideration be given to the vehicle and pedestrian connections to the Plan Change area including the management of the existing and proposed vehicle connections to Cambridge Road and the pedestrian connections at these intersections, both across Cambridge Road and between the two parts of the plan change area.

It is noted the previous traffic assessment that was undertaken to determine the appropriate intersection configuration at 638 Cambridge Road (dated June 2024) indicated that the intersection would continue to operate satisfactorily as a 'Give Way' controlled intersection with the additional traffic generated by the proposed Mitre 10 store.

However, the application of 20 years of growth (40%) to the through flows on Cambridge Road results in the operation of the existing configuration at the 638 Cambridge Road intersection becoming unsatisfactory.

On this basis, three options have been considered for the roading network in the vicinity of the Plan Change area.

All options include the provision of a shared path along the southern side of Cambridge Road (in front of Area A) and between Cambridge Road and the proposed Area B development (Along the western side of Access 1).

The following sections provide.

- A description of each option.
- Preliminary designs that show the spatial requirements for each option.
- A 'Sidra Intersection' model for the weekday peak hours and Saturday peak period using the combined flows and distributions to determine the operation of each option. It should be noted that the intersections have been modelled as a network, rather than as isolated intersections.
- The pros and cons of each option.

3.5.1 Option 1 – Shared Path

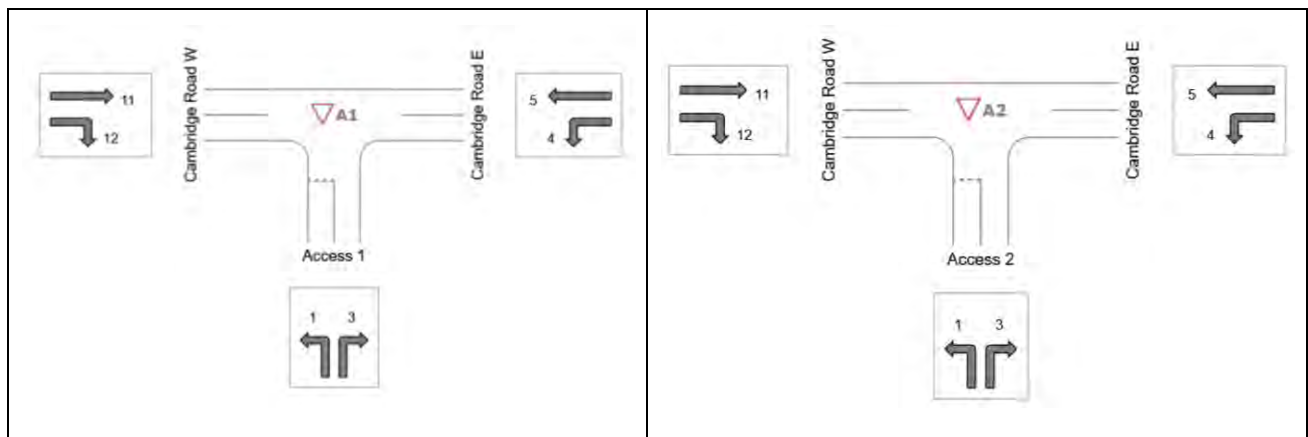
Option 1 considers the existing intersection controls and configurations, with the addition of a shared path along the southern side of Cambridge Road outside area A and along the western side of Access 1.

A pedestrian facility is also provided across Access 1 to provide a connection between Area A and Area B.

The preliminary design of Option 1 is provided as an appendix to this report.

A 'Sidra Intersection' analysis has been undertaken for Option 1 for the three identified peak periods. It should be noted that these intersections have been modelled as a network rather than as two intersections in isolation.

The results of this analysis are shown below. The diagram below shows the movement ID's that are referred to in the output tables. It should be noted that these tables show the operation of movements (not lanes).



MOVEMENT SUMMARY

▽ Site: A1 [Entrance 1 - Dev+40% AM Peak (Site Folder: Development+40%)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

■ Network: N101 [AM Shared Path (Network Folder: General)]

New Site

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. Back Of Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist] m			km/h
South: Access 1														
1	L2	All MCs	195	7.6	195	7.6	0.196	6.8	LOS A	0.3	2.4	0.50	0.68	44.7
3	R2	All MCs	28	18.5	28	18.5	0.161	25.1	LOS D	0.2	1.5	0.84	0.93	29.9
Approach			223	9.0	223	9.0	0.196	9.1	LOS A	0.3	2.4	0.54	0.71	43.2
East: Cambridge Road E														
4	L2	All MCs	63	15.0	63	15.0	0.268	4.7	LOS A	0.0	0.0	0.00	0.07	47.0
5	T1	All MCs	440	3.1	440	3.1	0.268	0.0	LOS A	0.0	0.0	0.00	0.07	49.3
Approach			503	4.6	503	4.6	0.268	0.6	NA	0.0	0.0	0.00	0.07	49.0
West: Cambridge Road W														
11	T1	All MCs	402	4.5	402	4.5	0.212	0.1	LOS A	0.0	0.0	0.00	0.00	49.9
12	R2	All MCs	240	6.6	240	6.6	0.241	7.3	LOS A	0.4	3.2	0.57	0.72	44.4
Approach			642	5.2	642	5.2	0.241	2.8	NA	0.4	3.2	0.21	0.27	46.8
All Vehicles			1368	5.6	1368	5.6	0.268	3.0	NA	0.4	3.2	0.19	0.27	46.6

Figure 3: Option 1 – AM Peak – Access 1

MOVEMENT SUMMARY

Site: A2 [Entrance 2 AM Peak - Dev+40% (Site Folder: Development+40%)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Network: N101 [AM Shared Path (Network Folder: General)]

New Site

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. Back Of Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed	
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]			km/h	
South: Access 2															
1	L2	All MCs	72	2.9	72	2.9	0.069	6.3	LOS A	0.1	0.8	0.45	0.63	0.45	42.6
3	R2	All MCs	27	0.0	27	0.0	0.078	13.7	LOS B	0.1	0.8	0.72	0.88	0.72	41.0
Approach			99	2.1	99	2.1	0.078	8.4	LOS A	0.1	0.8	0.53	0.70	0.53	41.9
East: Cambridge Road E															
4	L2	All MCs	83	1.3	83	1.3	0.274	4.7	LOS A	0.0	0.0	0.00	0.09	0.00	48.1
5	T1	All MCs	432	4.9	432	4.9	0.274	0.1	LOS A	0.0	0.0	0.00	0.09	0.00	48.9
Approach			515	4.3	515	4.3	0.274	0.8	NA	0.0	0.0	0.00	0.09	0.00	48.7
West: Cambridge Road W															
11	T1	All MCs	322	6.9	322	6.9	0.173	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
12	R2	All MCs	108	1.0	108	1.0	0.105	6.8	LOS A	0.2	1.3	0.53	0.69	0.53	41.7
Approach			431	5.4	431	5.4	0.173	1.7	NA	0.2	1.3	0.13	0.17	0.13	47.6
All Vehicles			1044	4.5	1044	4.5	0.274	1.9	NA	0.2	1.3	0.10	0.18	0.10	47.4

Figure 4: Option 1 – AM Peak – Access 2

MOVEMENT SUMMARY

Site: A1 [Entrance 1 - Dev+40% PM Peak (Site Folder: Development+40%)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Network: N101 [PM Shared Path (Network Folder: General)]

New Site

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. Back Of Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed	
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]			km/h	
South: Access 1															
1	L2	All MCs	399	0.8	399	0.8	0.335	6.2	LOS A	0.7	4.6	0.47	0.64	0.48	44.9
3	R2	All MCs	160	1.3	160	1.3	0.917	74.0	LOS F	2.7	19.3	0.99	1.58	3.00	16.7
Approach			559	0.9	559	0.9	0.917	25.6	LOS D	2.7	19.3	0.62	0.91	1.20	34.9
East: Cambridge Road E															
4	L2	All MCs	80	2.6	80	2.6	0.218	4.6	LOS A	0.0	0.0	0.00	0.11	0.00	47.0
5	T1	All MCs	332	3.8	332	3.8	0.218	0.0	LOS A	0.0	0.0	0.00	0.11	0.00	48.9
Approach			412	3.6	412	3.6	0.218	0.9	NA	0.0	0.0	0.00	0.11	0.00	48.5
West: Cambridge Road W															
11	T1	All MCs	594	3.5	594	3.5	0.311	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	49.8
12	R2	All MCs	347	1.2	347	1.2	0.294	6.5	LOS A	0.6	4.1	0.53	0.67	0.53	44.7
Approach			941	2.7	941	2.7	0.311	2.5	NA	0.6	4.1	0.20	0.25	0.20	47.0
All Vehicles			1912	2.4	1912	2.4	0.917	8.9	NA	2.7	19.3	0.28	0.41	0.45	42.1

Figure 5: Option 1 – PM Peak – Access 1

MOVEMENT SUMMARY

Site: A2 [Entrance 2 PM Peak - Dev+40% (Site Folder: Development+40%)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Network: N101 [PM Shared Path (Network Folder: General)]

New Site

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. Back Of Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed	
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]	m			km/h
South: Access 2															
1	L2	All MCs	120	0.9	120	0.9	0.097	5.6	LOS A	0.2	1.1	0.37	0.58	0.37	43.0
3	R2	All MCs	123	0.0	123	0.0	0.503	25.6	LOS D	0.9	6.2	0.89	1.07	1.28	36.1
Approach			243	0.4	243	0.4	0.503	15.8	LOS C	0.9	6.2	0.63	0.83	0.83	38.2
East: Cambridge Road E															
4	L2	All MCs	102	2.1	102	2.1	0.210	4.6	LOS A	0.0	0.0	0.00	0.14	0.00	47.9
5	T1	All MCs	292	4.7	292	4.7	0.210	0.1	LOS A	0.0	0.0	0.00	0.14	0.00	48.3
Approach			394	4.0	394	4.0	0.210	1.3	NA	0.0	0.0	0.00	0.14	0.00	48.1
West: Cambridge Road W															
11	T1	All MCs	645	3.6	645	3.6	0.339	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	49.8
12	R2	All MCs	108	0.0	108	0.0	0.089	6.1	LOS A	0.2	1.1	0.46	0.63	0.46	42.1
Approach			754	3.1	754	3.1	0.339	0.9	NA	0.2	1.1	0.07	0.09	0.07	48.5
All Vehicles			1391	2.9	1391	2.9	0.503	3.6	NA	0.9	6.2	0.15	0.23	0.18	45.9

Figure 6: Option 1- PM Peak- Access 2

MOVEMENT SUMMARY

Site: A1 [Entrance 1 - Dev+40% Sat (Site Folder: Development+40%)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Network: N101 [Saturday Shared Path (Network Folder: General)]

New Site

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]				km/h
South: Access 1															
1	L2	All MCs	432	2.4	432	2.4	0.358	6.2	LOS A	0.7	5.3	0.47	0.63	0.48	44.9
3	R2	All MCs	140	4.5	140	4.5	0.957	95.2	LOS F	2.9	21.4	0.99	1.67	3.35	14.0
Approach			572	2.9	572	2.9	0.957	28.0	LOS D	2.9	21.4	0.59	0.89	1.18	34.2
East: Cambridge Road E															
4	L2	All MCs	132	4.0	132	4.0	0.235	4.6	LOS A	0.0	0.0	0.00	0.16	0.00	46.5
5	T1	All MCs	313	1.3	313	1.3	0.235	0.0	LOS A	0.0	0.0	0.00	0.16	0.00	48.5
Approach			444	2.1	444	2.1	0.235	1.4	NA	0.0	0.0	0.00	0.16	0.00	47.9
West: Cambridge Road W															
11	T1	All MCs	581	1.8	581	1.8	0.301	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
12	R2	All MCs	413	2.3	413	2.3	0.366	7.2	LOS A	0.9	6.2	0.57	0.74	0.66	44.4
Approach			994	2.0	994	2.0	0.366	3.1	NA	0.9	6.2	0.24	0.31	0.27	46.5
All Vehicles			2009	2.3	2009	2.3	0.957	9.8	NA	2.9	21.4	0.29	0.44	0.47	41.7

Figure 7: Option 1 – Saturday Peak – Access 1

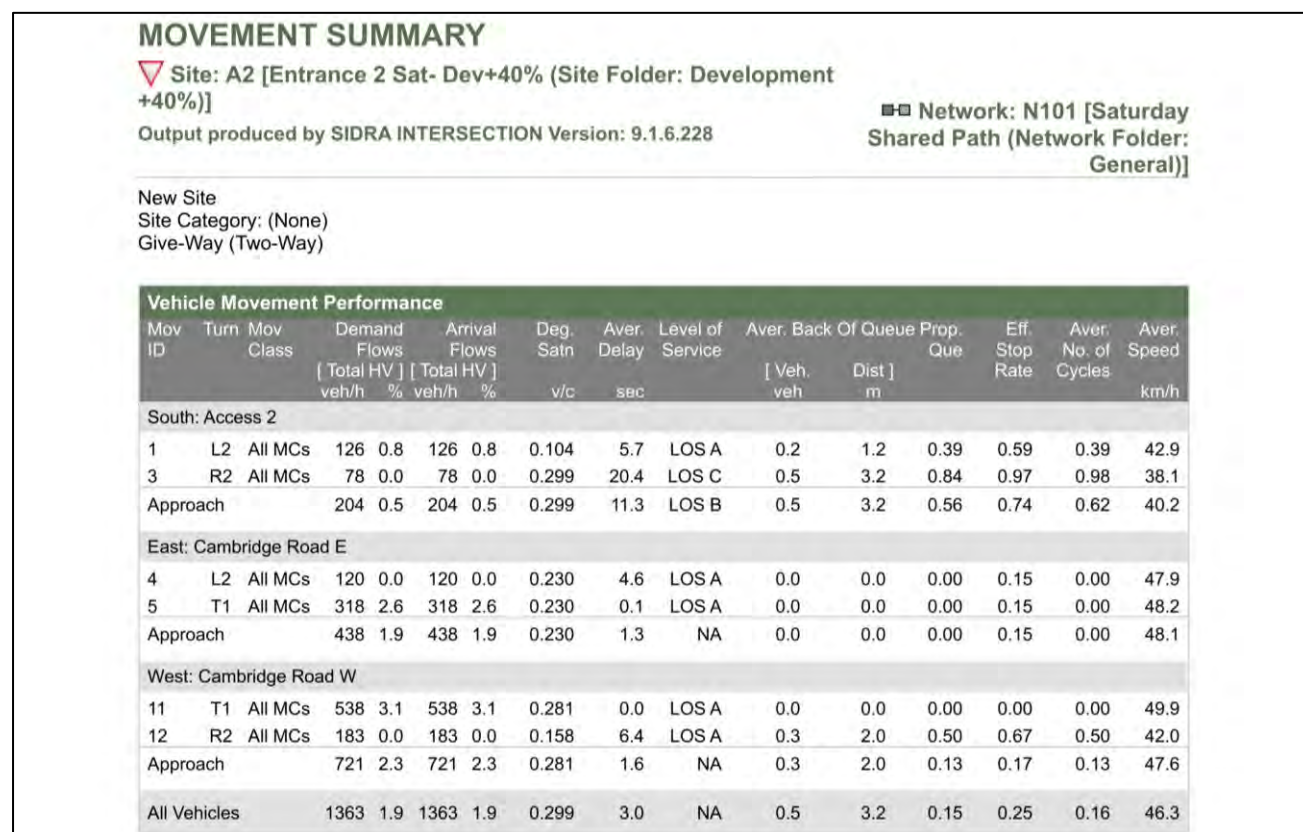


Figure 8: Option 1 – Saturday Peak – Access 2

The following is a summary of the Sidra results.

The vehicle movements with the worst performance are the right turn out of each of the accesses, with all other movements experiencing LOS A operation during all of the identified peak periods.

This is as would be expected, given that these two right turns have to yield to all other vehicle movements at the intersections.

The operational statistics for the two right turns are as follows.

	Degree of Saturation	Average Delay	Level Of Service	Average Queue
Access 1 Right Turn (AM Peak)	0.161	25.1 seconds	LOS D	1.5 metres
Access 2 Right Turn (AM Peak)	0.078	13.7 seconds	LOS B	0.8 metres
Access 1 Right Turn (PM Peak)	0.917	74 seconds	LOS F	19.3 metres
Access 2 Right Turn (PM Peak)	0.507	25.6 seconds	LOS D	6.2 metres
Access 1 Right Turn (Saturday)	0.957	95.2 seconds	LOS F	21.4 metres
Access 2 Right Turn (Saturday)	0.299	20.4 seconds	LOS C	3.2 metres

As can be seen above the right turn from Access 1 to Cambridge Road has the worst operational performance.

During the PM Peak and Saturday peak period, the performance becomes very poor. Some migration of vehicle movements from Access 1 to Access 2 may occur as a result, however this will likely result in shifting the poor operational performance to Access 2.

The right turn from Access 2 onto Cambridge Road operates reasonably well during all of the identified peak periods, with the worst operational performance occurring during the PM peak period. However, this movement still operates reasonably well, with an acceptable Level of Service, queue length and delay.

Although Option 1 provides good pedestrian amenity and good performance during the AM peak hour, the operation of the right turn from Access 1 to Cambridge Road becomes unacceptable during the PM peak and Saturday peak period.

On this basis, a higher level of control is recommended for the management of Access 1.

3.5.2 Option 2- Access 1 Roundabout

Option 2 considers the provision of a roundabout at Access 1, with the addition of a shared path along the southern side of Cambridge Road outside area A and along the western side of Access 1.

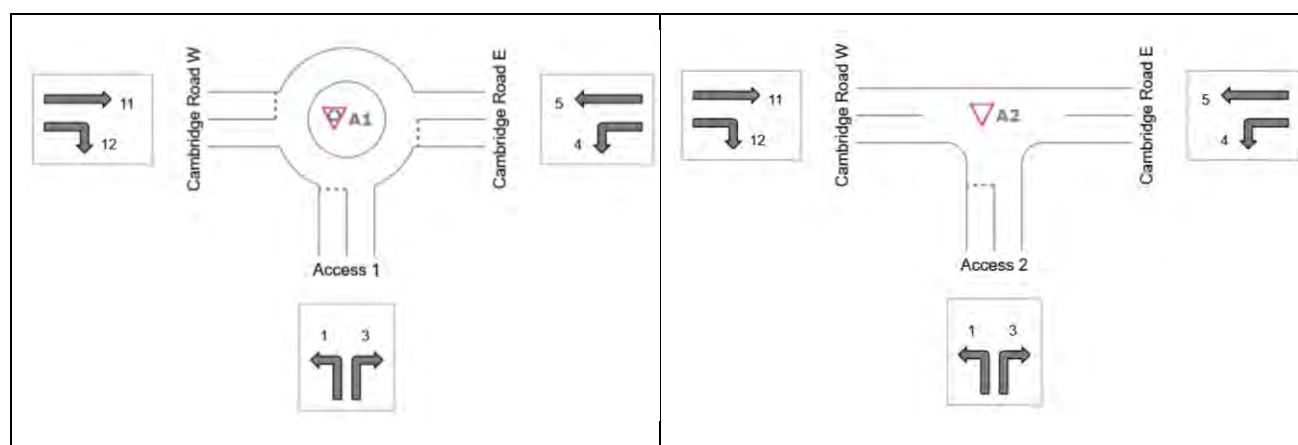
A pedestrian facility is also provided across Access 1 to provide a connection between Area A and Area B.

The preliminary design of Option 2 is provided as an appendix to this report.

Given that Access 1 provides the connection to the Area B for large delivery vehicles, the roundabout has been designed to accommodate the spatial requirements for semi-trailers, while still providing the required deflection for smaller vehicles.

A 'Sidra Intersection' analysis has been undertaken for Option 2 for the three identified peak periods. It should be noted that these intersections have been modelled as a network rather than as two intersections in isolation.

The results of this analysis are shown below. The diagram below shows the movement ID's that are referred to in the output tables. It should be noted that these tables show the operation of movements (not lanes).



MOVEMENT SUMMARY

Site: A1 [Entrance 1 AM - Roundabout - Dev+40%thru (Site Folder: Roundabout)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Network: N101 [AM Roundabout (Network Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. Back Of Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed	
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]	m		km/h	
South: Access 1															
1	L2	All MCs	195	7.6	195	7.6	0.265	6.9	LOS A	0.6	4.6	0.61	0.66	0.61	44.3
3	R2	All MCs	28	18.5	28	18.5	0.265	9.7	LOS A	0.6	4.6	0.61	0.66	0.61	41.9
Approach			223	9.0	223	9.0	0.265	7.3	LOS A	0.6	4.6	0.61	0.66	0.61	44.2
East: Cambridge Road E															
4	L2	All MCs	63	15.0	63	15.0	0.466	6.2	LOS A	1.2	8.8	0.52	0.55	0.52	42.0
5	T1	All MCs	440	3.1	440	3.1	0.466	5.4	LOS A	1.2	8.8	0.52	0.55	0.52	42.8
Approach			503	4.6	503	4.6	0.466	5.5	LOS A	1.2	8.8	0.52	0.55	0.52	42.7
West: Cambridge Road W															
11	T1	All MCs	402	4.5	402	4.5	0.436	3.9	LOS A	1.4	10.0	0.19	0.50	0.19	43.6
12	R2	All MCs	240	6.6	240	6.6	0.436	6.8	LOS A	1.4	10.0	0.19	0.50	0.19	45.1
Approach			642	5.2	642	5.2	0.436	5.0	LOS A	1.4	10.0	0.19	0.50	0.19	44.4
All Vehicles			1368	5.6	1368	5.6	0.466	5.6	LOS A	1.4	10.0	0.38	0.54	0.38	43.8

Figure 9: Option 2 – AM Peak Access 1

MOVEMENT SUMMARY

Site: A2 [Entrance 2 AM Peak - Dev+40% (Site Folder: Hybrid Roundabout/Shared Path)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Network: N101 [AM Network (Network Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. Back Of Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed	
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]			km/h	
South: Access 2															
1	L2	All MCs	72	2.9	72	2.9	0.069	6.3	LOS A	0.1	0.8	0.45	0.63	0.45	42.6
3	R2	All MCs	27	0.0	27	0.0	0.078	13.7	LOS B	0.1	0.8	0.72	0.88	0.72	41.0
Approach			99	2.1	99	2.1	0.078	8.4	LOS A	0.1	0.8	0.53	0.70	0.53	41.9
East: Cambridge Road E															
4	L2	All MCs	83	1.3	83	1.3	0.274	4.7	LOS A	0.0	0.0	0.00	0.09	0.00	48.1
5	T1	All MCs	432	4.9	432	4.9	0.274	0.1	LOS A	0.0	0.0	0.00	0.09	0.00	48.9
Approach			515	4.3	515	4.3	0.274	0.8	NA	0.0	0.0	0.00	0.09	0.00	48.7
West: Cambridge Road W															
11	T1	All MCs	322	6.9	322	6.9	0.173	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
12	R2	All MCs	108	1.0	108	1.0	0.105	6.8	LOS A	0.2	1.3	0.53	0.69	0.53	41.7
Approach			431	5.4	431	5.4	0.173	1.7	NA	0.2	1.3	0.13	0.17	0.13	47.6
All Vehicles			1044	4.5	1044	4.5	0.274	1.9	NA	0.2	1.3	0.10	0.18	0.10	47.4

Figure 10: Option 2 – AM Peak – Access 2

MOVEMENT SUMMARY

Site: A1 [Entrance 1 PM Peak - Roundabout - Dev+40%thru
(Site Folder: Roundabout)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Network: N101 [PM
Roundabout (Network Folder:
General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV] veh/h	%	[Total HV] veh/h	%				[Veh. veh	Dist] m				
South: Access 1															
1	L2	All MCs	399	0.8	399	0.8	0.639	10.0	LOS B	3.0	21.2	0.89	0.74	1.03	42.6
3	R2	All MCs	160	1.3	160	1.3	0.639	12.7	LOS B	3.0	21.2	0.89	0.74	1.03	38.7
Approach			559	0.9	559	0.9	0.639	10.8	LOS B	3.0	21.2	0.89	0.74	1.03	41.9
East: Cambridge Road E															
4	L2	All MCs	80	2.6	80	2.6	0.445	6.5	LOS A	1.2	8.9	0.66	0.61	0.66	41.8
5	T1	All MCs	332	3.8	332	3.8	0.445	6.1	LOS A	1.2	8.9	0.66	0.61	0.66	42.3
Approach			412	3.6	412	3.6	0.445	6.2	LOS A	1.2	8.9	0.66	0.61	0.66	42.2
West: Cambridge Road W															
11	T1	All MCs	594	3.5	594	3.5	0.778	5.9	LOS A	4.2	30.3	0.79	0.59	0.81	41.3
12	R2	All MCs	347	1.2	347	1.2	0.778	8.7	LOS A	4.2	30.3	0.79	0.59	0.81	43.9
Approach			941	2.7	941	2.7	0.778	7.0	LOS A	4.2	30.3	0.79	0.59	0.81	42.7
All Vehicles			1912	2.4	1912	2.4	0.778	7.9	LOS A	4.2	30.3	0.79	0.64	0.84	42.3

Figure 11: Option 2 – PM Peak – Access 1

MOVEMENT SUMMARY

Site: A2 [Entrance 2 PM Peak - Dev+40% (Site Folder: Hybrid Roundabout/Shared Path)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Network: N101 [PM Network
(Network Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. Back Of Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed	
			[Total HV]	%	[Total HV]	%				[Veh. veh	Dist]				
			veh/h		veh/h		v/c	sec			m			km/h	
South: Access 2															
1	L2	All MCs	120	0.9	120	0.9	0.097	5.6	LOS A	0.2	1.1	0.37	0.58	0.37	43.0
3	R2	All MCs	123	0.0	123	0.0	0.503	25.6	LOS D	0.9	6.2	0.89	1.07	1.28	36.1
Approach			243	0.4	243	0.4	0.503	15.8	LOS C	0.9	6.2	0.63	0.83	0.83	38.2
East: Cambridge Road E															
4	L2	All MCs	102	2.1	102	2.1	0.210	4.6	LOS A	0.0	0.0	0.00	0.14	0.00	47.9
5	T1	All MCs	292	4.7	292	4.7	0.210	0.1	LOS A	0.0	0.0	0.00	0.14	0.00	48.3
Approach			394	4.0	394	4.0	0.210	1.3	NA	0.0	0.0	0.00	0.14	0.00	48.1
West: Cambridge Road W															
11	T1	All MCs	645	3.6	645	3.6	0.339	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	49.8
12	R2	All MCs	108	0.0	108	0.0	0.089	6.1	LOS A	0.2	1.1	0.46	0.63	0.46	42.1
Approach			754	3.1	754	3.1	0.339	0.9	NA	0.2	1.1	0.07	0.09	0.07	48.5
All Vehicles			1391	2.9	1391	2.9	0.503	3.6	NA	0.9	6.2	0.15	0.23	0.18	45.9

Figure 12: Option 2 – PM Peak – Access 2

MOVEMENT SUMMARY

Site: A1 [Entrance 1 Saturday Peak - Roundabout - Dev+40%
thru (Site Folder: Roundabout)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Network: N101 [Sat
Roundabout (Network Folder:
General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. Back Of Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed	
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]				km/h
South: Access 1															
1	L2	All MCs	432	2.4	432	2.4	0.578	7.0	LOS A	2.0	14.2	0.71	0.67	0.74	44.2
3	R2	All MCs	140	4.5	140	4.5	0.578	9.5	LOS A	2.0	14.2	0.71	0.67	0.74	41.5
Approach			572	2.9	572	2.9	0.578	7.6	LOS A	2.0	14.2	0.71	0.67	0.74	43.8
East: Cambridge Road E															
4	L2	All MCs	132	4.0	132	4.0	0.505	7.5	LOS A	1.5	11.0	0.73	0.68	0.77	41.4
5	T1	All MCs	313	1.3	313	1.3	0.505	7.0	LOS A	1.5	11.0	0.73	0.68	0.77	41.9
Approach			444	2.1	444	2.1	0.505	7.1	LOS A	1.5	11.0	0.73	0.68	0.77	41.8
West: Cambridge Road W															
11	T1	All MCs	581	1.8	581	1.8	0.790	5.4	LOS A	4.2	30.0	0.76	0.57	0.76	41.3
12	R2	All MCs	413	2.3	413	2.3	0.790	8.3	LOS A	4.2	30.0	0.76	0.57	0.76	43.9
Approach			994	2.0	994	2.0	0.790	6.6	LOS A	4.2	30.0	0.76	0.57	0.76	42.8
All Vehicles			2009	2.3	2009	2.3	0.790	7.0	LOS A	4.2	30.0	0.74	0.62	0.76	42.9

Figure 13: Option 2 – Saturday Peak – Access 1

MOVEMENT SUMMARY

Site: A2 [Entrance 2 Sat- Dev+40% - Copy (Site Folder:
Hybrid Roundabout/Shared Path)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Network: N101 [Sat Network
(Network Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]				km/h
South: Access 2															
1	L2	All MCs	126	0.8	126	0.8	0.104	5.7	LOS A	0.2	1.2	0.39	0.59	0.39	42.9
3	R2	All MCs	78	0.0	78	0.0	0.299	20.4	LOS C	0.5	3.2	0.84	0.97	0.98	38.1
Approach			204	0.5	204	0.5	0.299	11.3	LOS B	0.5	3.2	0.56	0.74	0.62	40.2
East: Cambridge Road E															
4	L2	All MCs	120	0.0	120	0.0	0.230	4.6	LOS A	0.0	0.0	0.00	0.15	0.00	47.9
5	T1	All MCs	318	2.6	318	2.6	0.230	0.1	LOS A	0.0	0.0	0.00	0.15	0.00	48.2
Approach			438	1.9	438	1.9	0.230	1.3	NA	0.0	0.0	0.00	0.15	0.00	48.1
West: Cambridge Road W															
11	T1	All MCs	538	3.1	538	3.1	0.281	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
12	R2	All MCs	183	0.0	183	0.0	0.158	6.4	LOS A	0.3	2.0	0.50	0.67	0.50	42.0
Approach			721	2.3	721	2.3	0.281	1.6	NA	0.3	2.0	0.13	0.17	0.13	47.6
All Vehicles			1363	1.9	1363	1.9	0.299	3.0	NA	0.5	3.2	0.15	0.25	0.16	46.3

Figure 14: Option 2 – Saturday Peak – Access 2

Option 2 operates very well for all movements during all identified peak periods. The roundabout at Access 1 provides a relatively equal operation for each leg of the intersection, with all legs having to yield to the vehicles to the right.

This equalisation has a similar effect on the operational statistics, with all movements experiencing similar levels of delay, Level of Service and queueing length.

In summary, Option 2 provides good pedestrian amenity and good performance during all peak hours.

3.5.3 Option 3 – Access 1 Traffic Signals

Option 3 considers the provision of traffic signals at Access 1, with the addition of a shared path along the southern side of Cambridge Road outside area A and along the western side of Access 1.

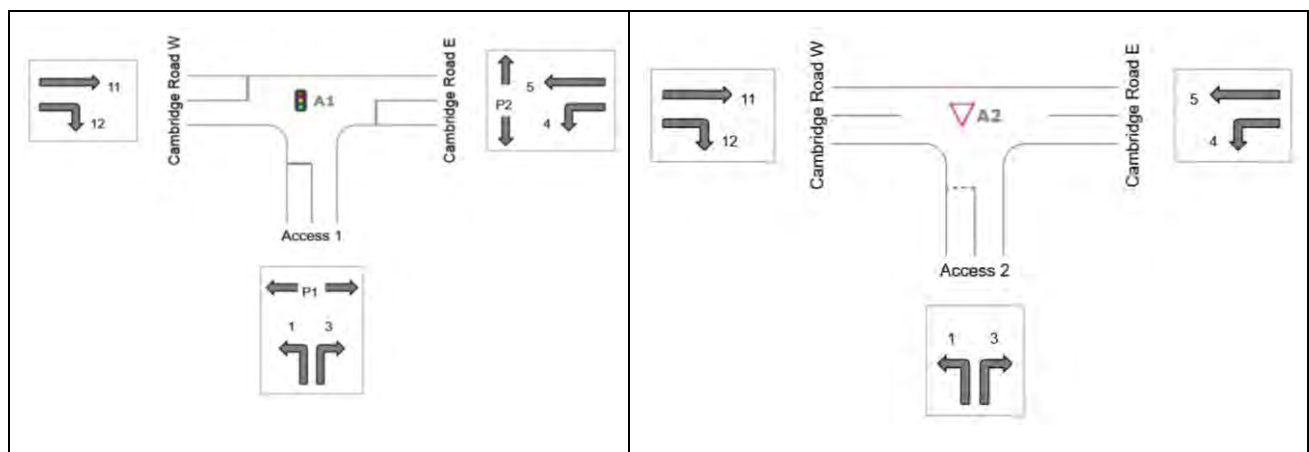
and between Cambridge Road and the Area B development.

A pedestrian facility is also provided across Access 1 to provide a connection between Area A and Area B.

The preliminary design of Option 3 is provided as an appendix to this report.

A 'Sidra Intersection' analysis has been undertaken for Option 3 for the three identified peak periods. It should be noted that these intersections have been modelled as a network rather than as two intersections in isolation.

The results of this analysis are shown below. The diagram below shows the movement ID's that are referred to in the output tables. It should be noted that these tables show the operation of movements (not lanes).



MOVEMENT SUMMARY

 Site: A1 [Entrance 1 - Dev+40% AM Peak - Updt Phase (Site Folder: Hybrid Signals/Shared Path)]

 Network: N101 [AM Network (Network Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 50 seconds (Site Practical Cycle Time)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV] veh/h	%	[Total HV] veh/h	%				[Veh. veh	Dist] m				
South: Access 1															
1	L2	All MCs	195	7.6	195	7.6	0.300	16.6	LOS B	2.1	15.6	0.74	0.75	0.74	39.9
3	R2	All MCs	28	18.5	28	18.5	*0.149	27.7	LOS C	0.4	3.3	0.93	0.71	0.93	28.7
Approach			223	9.0	223	9.0	0.300	18.0	LOS B	2.1	15.6	0.76	0.74	0.76	38.8
East: Cambridge Road E															
4	L2	All MCs	63	15.0	63	15.0	*0.708	21.2	LOS C	6.9	50.1	0.91	0.84	0.97	35.4
5	T1	All MCs	440	3.1	440	3.1	0.708	15.6	LOS B	6.9	50.1	0.91	0.84	0.97	36.7
Approach			503	4.6	503	4.6	0.708	16.3	LOS B	6.9	50.1	0.91	0.84	0.97	36.5
West: Cambridge Road W															
11	T1	All MCs	402	4.5	402	4.5	0.482	11.0	LOS B	4.4	31.8	0.76	0.65	0.76	38.6
12	R2	All MCs	240	6.6	240	6.6	*0.698	27.3	LOS C	3.7	27.5	0.98	0.89	1.13	35.7
Approach			642	5.2	642	5.2	0.698	17.1	LOS B	4.4	31.8	0.84	0.74	0.90	37.0
All Vehicles			1368	5.6	1368	5.6	0.708	16.9	LOS B	6.9	50.1	0.85	0.78	0.90	37.2

Figure 15: Option 3 – AM Peak – Access 1

MOVEMENT SUMMARY

 Site: A2 [Entrance 2 AM Peak - Dev+40% (Site Folder: Hybrid Signals/Shared Path)]

 Network: N101 [AM Network (Network Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. Back Of Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed	
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]	m			km/h
South: Access 2															
1	L2	All MCs	72	2.9	72	2.9	0.069	6.3	LOS A	0.1	0.8	0.45	0.63	0.45	42.6
3	R2	All MCs	27	0.0	27	0.0	0.068	12.3	LOS B	0.1	0.7	0.68	0.86	0.68	41.7
Approach			99	2.1	99	2.1	0.069	8.0	LOS A	0.1	0.8	0.52	0.70	0.52	42.2
East: Cambridge Road E															
4	L2	All MCs	83	1.3	83	1.3	0.274	4.7	LOS A	0.0	0.0	0.00	0.09	0.00	48.1
5	T1	All MCs	432	4.9	432	4.9	0.274	0.1	LOS A	0.0	0.0	0.00	0.09	0.00	48.9
Approach			515	4.3	515	4.3	0.274	0.8	NA	0.0	0.0	0.00	0.09	0.00	48.7
West: Cambridge Road W															
11	T1	All MCs	322	6.9	322	6.9	0.173	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
12	R2	All MCs	108	1.0	108	1.0	0.105	6.8	LOS A	0.1	1.1	0.45	0.67	0.45	41.7
Approach			431	5.4	431	5.4	0.173	1.7	NA	0.1	1.1	0.11	0.17	0.11	47.6
All Vehicles			1044	4.5	1044	4.5	0.274	1.9	NA	0.1	1.1	0.10	0.18	0.10	47.5

Figure 16: Option 3 – AM Peak – Access 2

MOVEMENT SUMMARY

 Site: A1 [Entrance 1 - Dev+40% PM Peak - Updt Phase (Site Folder: Hybrid Signals/Shared Path)]

 Network: N101 [PM Network (Network Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Access 1

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 50 seconds (Site Practical Cycle Time)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. Back Of Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed	
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]	m			km/h
South: Access 1															
1	L2	All MCs	399	0.8	399	0.8	0.485	14.9	LOS B	4.2	29.9	0.74	0.78	0.74	40.7
3	R2	All MCs	160	1.3	160	1.3	* 0.748	31.6	LOS C	2.7	18.9	1.00	0.93	1.29	27.0
Approach			559	0.9	559	0.9	0.748	19.7	LOS B	4.2	29.9	0.82	0.82	0.90	37.5
East: Cambridge Road E															
4	L2	All MCs	80	2.6	80	2.6	0.734	24.8	LOS C	6.1	44.2	0.95	0.90	1.08	33.4
5	T1	All MCs	332	3.8	332	3.8	0.734	19.2	LOS B	6.1	44.2	0.95	0.90	1.08	34.4
Approach			412	3.6	412	3.6	0.734	20.3	LOS C	6.1	44.2	0.95	0.90	1.08	34.2
West: Cambridge Road W															
11	T1	All MCs	594	3.5	594	3.5	* 0.708	13.4	LOS B	7.7	55.4	0.87	0.80	0.92	36.7
12	R2	All MCs	347	1.2	347	1.2	0.695	23.9	LOS C	5.1	35.9	0.95	0.88	1.04	36.9
Approach			941	2.7	941	2.7	0.708	17.3	LOS B	7.7	55.4	0.90	0.83	0.96	36.8
All Vehicles			1912	2.4	1912	2.4	0.748	18.6	LOS B	7.7	55.4	0.89	0.84	0.97	36.5

Figure 17: Option 3 – PM Peak – Access 1

MOVEMENT SUMMARY

 Site: A2 [Entrance 2 PM Peak - Dev+40% (Site Folder: Hybrid Signals/Shared Path)]

 Network: N101 [PM Network (Network Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. Back Of Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed	
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]	m			km/h
South: Access 2															
1	L2	All MCs	120	0.9	120	0.9	0.097	5.6	LOS A	0.2	1.1	0.37	0.58	0.37	43.0
3	R2	All MCs	123	0.0	123	0.0	0.375	18.3	LOS C	0.7	4.7	0.81	0.99	1.05	39.0
Approach			243	0.4	243	0.4	0.375	12.1	LOS B	0.7	4.7	0.59	0.79	0.71	40.2
East: Cambridge Road E															
4	L2	All MCs	102	2.1	102	2.1	0.210	4.6	LOS A	0.0	0.0	0.00	0.14	0.00	47.9
5	T1	All MCs	292	4.7	292	4.7	0.210	0.1	LOS A	0.0	0.0	0.00	0.14	0.00	48.3
Approach			394	4.0	394	4.0	0.210	1.3	NA	0.0	0.0	0.00	0.14	0.00	48.1
West: Cambridge Road W															
11	T1	All MCs	645	3.6	645	3.6	0.339	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	49.8
12	R2	All MCs	108	0.0	108	0.0	0.089	6.1	LOS A	0.1	0.9	0.34	0.61	0.34	42.3
Approach			754	3.1	754	3.1	0.339	0.9	NA	0.1	0.9	0.05	0.09	0.05	48.6
All Vehicles			1391	2.9	1391	2.9	0.375	2.9	NA	0.7	4.7	0.13	0.23	0.15	46.5

Figure 18: Option 3 – PM Peak – Access 2

MOVEMENT SUMMARY

 Site: A1 [Entrance 1 - Dev+40% Sat - Updt Phase (Site Folder: Hybrid Signals/Shared Path)]

 Network: N101 [Sat Network (Network Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 50 seconds (Site Practical Cycle Time)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. Back Of Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed	
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]	m			km/h
South: Access 1															
1	L2	All MCs	432	2.4	432	2.4	0.531	15.2	LOS B	4.7	33.8	0.76	0.79	0.76	40.5
3	R2	All MCs	140	4.5	140	4.5	* 0.669	30.4	LOS C	2.3	16.4	1.00	0.87	1.18	27.5
Approach			572	2.9	572	2.9	0.669	18.9	LOS B	4.7	33.8	0.82	0.81	0.86	38.0
East: Cambridge Road E															
4	L2	All MCs	132	4.0	132	4.0	* 0.794	26.9	LOS C	7.1	50.6	0.98	0.98	1.19	32.1
5	T1	All MCs	313	1.3	313	1.3	0.794	21.3	LOS C	7.1	50.6	0.98	0.98	1.19	33.0
Approach			444	2.1	444	2.1	0.794	22.9	LOS C	7.1	50.6	0.98	0.98	1.19	32.8
West: Cambridge Road W															
11	T1	All MCs	581	1.8	581	1.8	0.685	12.8	LOS B	7.3	51.8	0.86	0.77	0.88	37.2
12	R2	All MCs	413	2.3	413	2.3	* 0.832	29.1	LOS C	7.1	50.5	1.00	1.00	1.31	35.1
Approach			994	2.0	994	2.0	0.832	19.6	LOS B	7.3	51.8	0.92	0.87	1.06	35.9
All Vehicles			2009	2.3	2009	2.3	0.832	20.1	LOS C	7.3	51.8	0.90	0.88	1.03	35.9

Figure 19: Option 3 – Saturday Peak – Access 1

MOVEMENT SUMMARY

 Site: A2 [Entrance 2 Sat- Dev+40% (Site Folder: Hybrid Signals/Shared Path)]

 Network: N101 [Sat Network (Network Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. Back Of Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed	
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]	m		km/h	
South: Access 2															
1	L2	All MCs	126	0.8	126	0.8	0.104	5.7	LOS A	0.2	1.2	0.39	0.59	0.39	42.9
3	R2	All MCs	78	0.0	78	0.0	0.229	15.5	LOS C	0.4	2.5	0.77	0.92	0.83	40.2
Approach			204	0.5	204	0.5	0.229	9.4	LOS A	0.4	2.5	0.53	0.72	0.55	41.4
East: Cambridge Road E															
4	L2	All MCs	120	0.0	120	0.0	0.230	4.6	LOS A	0.0	0.0	0.00	0.15	0.00	47.9
5	T1	All MCs	318	2.6	318	2.6	0.230	0.1	LOS A	0.0	0.0	0.00	0.15	0.00	48.2
Approach			438	1.9	438	1.9	0.230	1.3	NA	0.0	0.0	0.00	0.15	0.00	48.1
West: Cambridge Road W															
11	T1	All MCs	538	3.1	538	3.1	0.281	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
12	R2	All MCs	183	0.0	183	0.0	0.158	6.4	LOS A	0.2	1.7	0.40	0.65	0.40	42.0
Approach			721	2.3	721	2.3	0.281	1.6	NA	0.2	1.7	0.10	0.16	0.10	47.6
All Vehicles			1363	1.9	1363	1.9	0.281	2.7	NA	0.4	2.5	0.13	0.24	0.14	46.6

Figure 20: Option 3 – Saturday Peak – Access 2

Option 3 operates well for all movements during all identified peak periods. The traffic signals at Access 1 stops through traffic on Cambridge Road during the Access 1 green phase and therefore the performance of the through traffic movements is affected.

However, the operation of the through movements is still acceptable, with all movements experiencing relatively low levels of delay, Level of Service and queueing length.

Option 3 provides superior pedestrian amenity in comparison with the other options as the traffic signals provides a signalised pedestrian crossing across Cambridge Road and Access 1. It is noted that Sidra has modelled these pedestrian phases as operating 48% of the traffic signal cycles.

It is also noted that this option is able to be constructed within the existing carriageway.

In summary, Option 3 provides superior pedestrian amenity and good performance during all peak hours.

Given that Option 3 is the recommended option (please refer to the Conclusion section) sensitivity testing has been undertaken to see how the traffic signals would operate if traffic turning right onto Cambridge Road from Access 2 migrate to the signalised intersection if this movement becomes difficult.

This sensitivity testing assumes that 30% of the Access 2 right turning traffic migrates to Access 1. The right turning traffic from Access 2 has not been discounted.

The Sidra outputs for the three identified peak periods are provided below.

MOVEMENT SUMMARY

Site: A1 [Entrance 1 - Dev+40% AM Peak - Updt Phase (Site Folder: Hybrid Signals/Shared Path + 30% RT Out)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Network: N101 [AM Network (Network Folder: General)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 50 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total HV] veh/h	Arrival Flows [Total HV] veh/h	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue Prop. [Veh. veh	Dist] m	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Access 1												
1	L2	All MCs	195 7.6	195 7.6	0.300	16.6	LOS B	2.1	15.6	0.74	0.75	39.9
3	R2	All MCs	37 14.3	37 14.3	*0.188	27.8	LOS C	0.5	4.2	0.93	0.72	28.6
Approach			232 8.6	232 8.6	0.300	18.4	LOS B	2.1	15.6	0.77	0.77	38.5
East: Cambridge Road E												
4	L2	All MCs	63 15.0	63 15.0	*0.708	21.2	LOS C	6.9	50.1	0.91	0.84	35.4
5	T1	All MCs	440 3.1	440 3.1	0.708	15.6	LOS B	6.9	50.1	0.91	0.84	36.7
Approach			503 4.6	503 4.6	0.708	16.3	LOS B	6.9	50.1	0.91	0.84	36.5
West: Cambridge Road W												
11	T1	All MCs	402 4.5	402 4.5	0.482	11.0	LOS B	4.4	31.8	0.76	0.65	38.6
12	R2	All MCs	240 6.6	240 6.6	*0.698	27.3	LOS C	3.7	27.5	0.98	0.89	35.7
Approach			642 5.2	642 5.2	0.698	17.1	LOS B	4.4	31.8	0.84	0.74	37.0
All Vehicles			1377 5.6	1377 5.6	0.708	17.0	LOS B	6.9	50.1	0.85	0.78	37.2

Figure 21: Option 3 – Access 1 – AM Peak – with 30% of Access 2 RT

MOVEMENT SUMMARY

Site: A1 [Entrance 1 - Dev+40% PM Peak - Updt Phase (Site Folder: Hybrid Signals/Shared Path + 30% RT Out)]

Network: N101 [PM Network (Network Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Access 1

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 50 seconds (Site Practical Cycle Time)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. Back Of Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed	
			[Total HV]	%	[Total HV]	%				[Veh. veh	Dist]				
			veh/h		veh/h		v/c	sec		veh	m			km/h	
South: Access 1															
1	L2	All MCs	399	0.8	399	0.8	0.485	14.9	LOS B	4.2	29.9	0.74	0.78	0.74	40.7
3	R2	All MCs	197	1.1	197	1.1	* 0.787	31.7	LOS C	3.3	23.5	1.00	0.97	1.34	26.9
Approach			596	0.9	596	0.9	0.787	20.5	LOS C	4.2	29.9	0.83	0.84	0.94	36.9
East: Cambridge Road E															
4	L2	All MCs	80	2.6	80	2.6	0.734	24.8	LOS C	6.1	44.2	0.95	0.90	1.08	33.4
5	T1	All MCs	332	3.8	332	3.8	0.734	19.2	LOS B	6.1	44.2	0.95	0.90	1.08	34.4
Approach			412	3.6	412	3.6	0.734	20.3	LOS C	6.1	44.2	0.95	0.90	1.08	34.2
West: Cambridge Road W															
11	T1	All MCs	594	3.5	594	3.5	* 0.742	15.2	LOS B	8.2	59.2	0.90	0.86	0.99	35.5
12	R2	All MCs	347	1.2	347	1.2	0.749	26.1	LOS C	5.4	38.2	0.97	0.92	1.15	36.2
Approach			941	2.7	941	2.7	0.749	19.2	LOS B	8.2	59.2	0.93	0.88	1.05	35.8
All Vehicles			1948	2.3	1948	2.3	0.787	19.8	LOS B	8.2	59.2	0.90	0.87	1.02	35.9

Figure 22: Option 3 – Access 1- PM Peak – with 30% of Access 2 RT

MOVEMENT SUMMARY

Site: A1 [Entrance 1 - Dev+40% Sat - Updt Phase (Site Folder: Hybrid Signals/Shared Path + 30% RT Out)]

Network: N101 [Sat Network (Network Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 50 seconds (Site Practical Cycle Time)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	Aver. Back Of Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed	
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]				
			veh/h		veh/h					veh	m			km/h	
South: Access 1															
1	L2	All MCs	432	2.4	432	2.4	0.531	15.2	LOS B	4.7	33.8	0.76	0.79	0.76	40.5
3	R2	All MCs	163	3.9	163	3.9	* 0.777	32.3	LOS C	2.8	20.0	1.00	0.96	1.35	26.7
Approach			595	2.8	595	2.8	0.777	19.9	LOS B	4.7	33.8	0.83	0.83	0.92	37.4
East: Cambridge Road E															
4	L2	All MCs	132	4.0	132	4.0	* 0.794	26.9	LOS C	7.1	50.6	0.98	0.98	1.19	32.1
5	T1	All MCs	313	1.3	313	1.3	0.794	21.3	LOS C	7.1	50.6	0.98	0.98	1.19	33.0
Approach			444	2.1	444	2.1	0.794	22.9	LOS C	7.1	50.6	0.98	0.98	1.19	32.8
West: Cambridge Road W															
11	T1	All MCs	581	1.8	581	1.8	0.685	12.8	LOS B	7.3	51.8	0.86	0.77	0.88	37.2
12	R2	All MCs	413	2.3	413	2.3	* 0.832	29.1	LOS C	7.1	50.5	1.00	1.00	1.31	35.1
Approach			994	2.0	994	2.0	0.832	19.6	LOS B	7.3	51.8	0.92	0.87	1.06	35.9
All Vehicles			2033	2.3	2033	2.3	0.832	20.4	LOS C	7.3	51.8	0.90	0.88	1.05	35.8

Figure 23: Option 3 – Access 1- Saturday Peak – with 30% of Access 2 RT

As can be seen in the above output tables, the right turn from Access 2 to Cambridge Road still operates well with the additional traffic migrated from the right turn from Access 2.

4. Request for Further Information (RFI)

Subsequent to issuing this report to Waipa District Council, a request for further information was received from Alice Morris, Senior Policy Planner (dated 29 August 2025).

Please refer to the traffic related response to the requests (dated 18 September 2025) prepared by Traffic Engineering and Management Ltd and additional responses provided by Planning Focus Limited (dated 19 September 2025).

5. Conclusions

5.1 Option 1

The right turn from Access 2 onto Cambridge Road operates reasonably well during all of the identified peak periods, with the worst operational performance occurring during the PM peak period. However, this movement still operates reasonably well, with an acceptable Level of Service, queue length and delay.

Although Option 1 provides good pedestrian amenity and good performance during the AM peak hour, the operation of the right turn from Access 1 to Cambridge Road becomes unacceptable during the PM peak and Saturday peak period. On this basis, a higher level of control is recommended for the management of Access 1.

5.2 Option 2

Option 2 operates very well for all movements during all identified peak periods. The roundabout at Access 1 provides a relatively equal operation for each leg of the intersection, with all legs having to yield to the vehicles to the right. This equalisation has a similar effect on the operational statistics, with all movements experiencing similar levels of delay, Level of Service and queueing length.

In summary, Option 2 provides good pedestrian amenity and good performance during all peak hours.

5.3 Option 3

Option 3 operates well for all movements during all identified peak periods. The traffic signals at Access 1 stops through traffic on Cambridge Road during the Access 1 green phase and therefore the performance of the through traffic movements is affected. However, the operation of the through movements is still acceptable, with all movements experiencing relatively low levels of delay, Level of Service and queueing length.

Option 3 provides superior pedestrian amenity in comparison with the other options as the traffic signals provides signalised pedestrian crossing across Cambridge Road and Access 1.

As discussed previously, the right turn from Access 2 to Cambridge Road still operates well with the additional traffic migrated from the right turn from Access 2.

In summary, Option 3 provides superior pedestrian amenity and good performance during all peak hours.

It is also noted that this option can be constructed within the existing road corridor.

5.4 Recommended Option

Option 3 which provides traffic signals at Access 1 is the preferred option.

Although Option 2 provides slightly better operational performance, Option 3 provides superior pedestrian amenity and does not require any changes to the kerb lines on Cambridge Road.

Appendices

ndix A Option 1 – Shared Path

ndix B Option 2 – Roundabout

ndix C Option 3 – Traffic Signals

ndix D Traffic Distribution Diagrams

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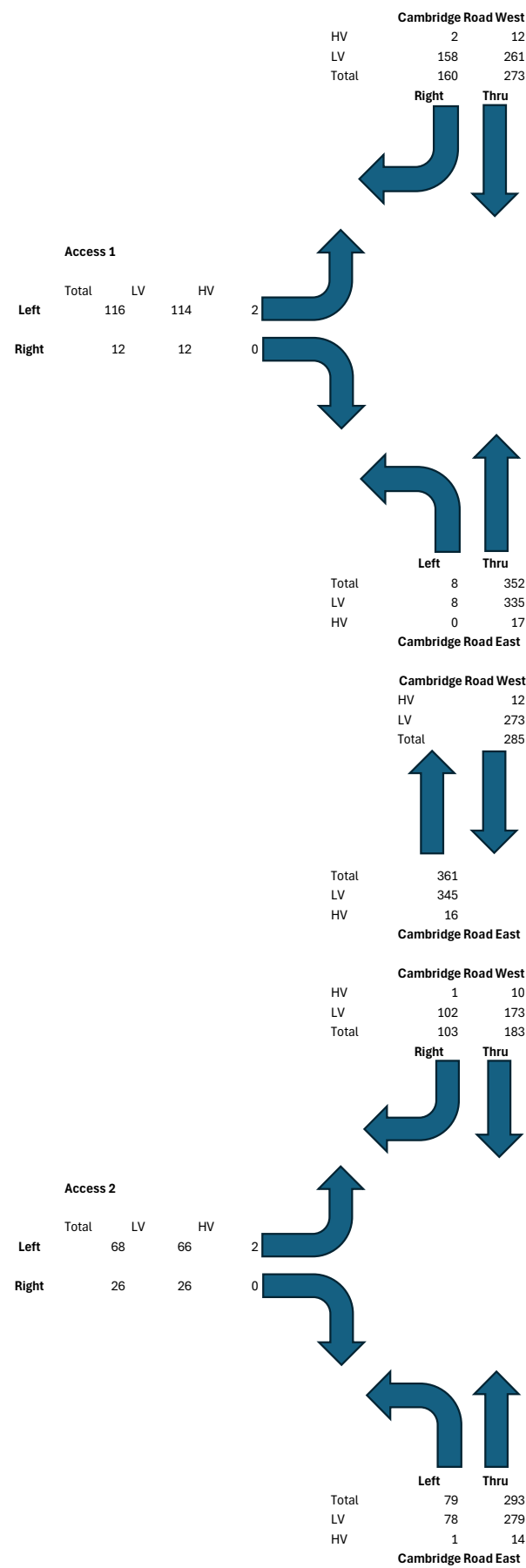
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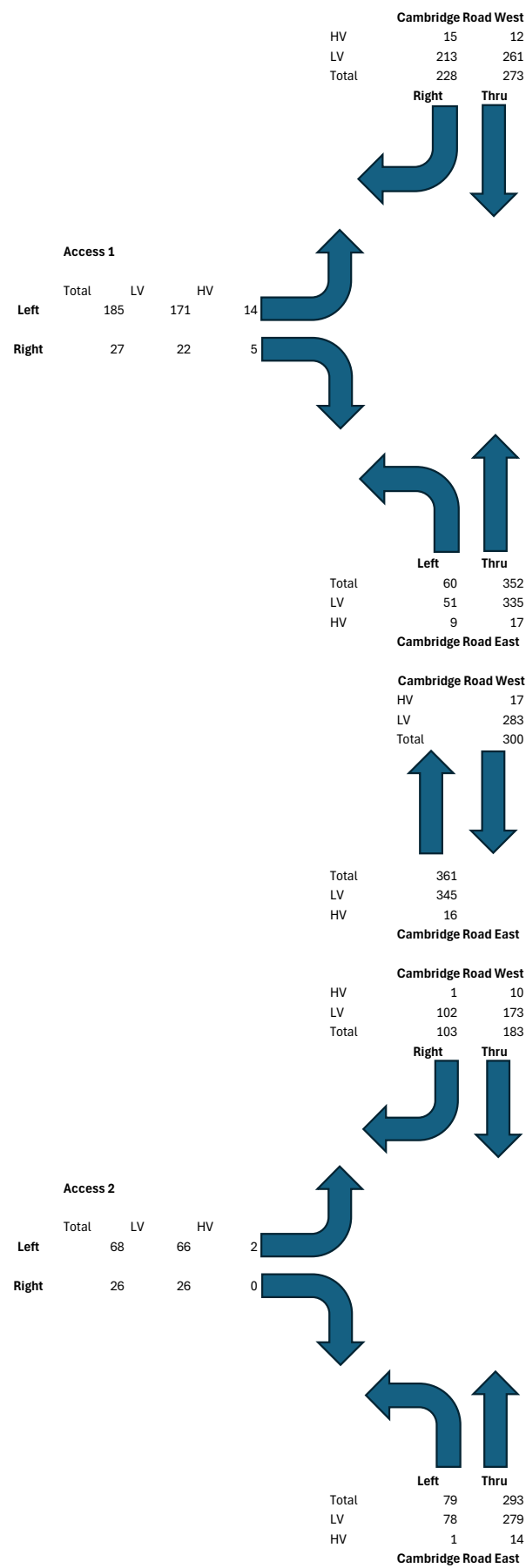


Traffic Assignments Process - AM Peak Hour

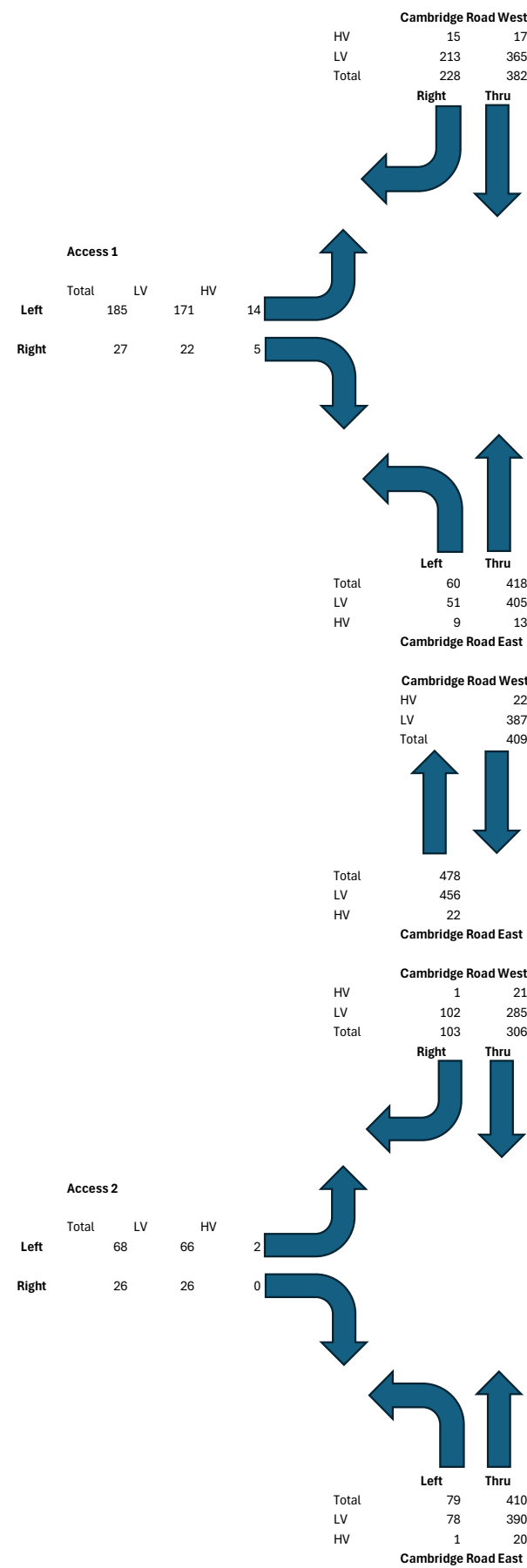
Surveyed Existing Movements



With Proposed Mitre 10 Traffic

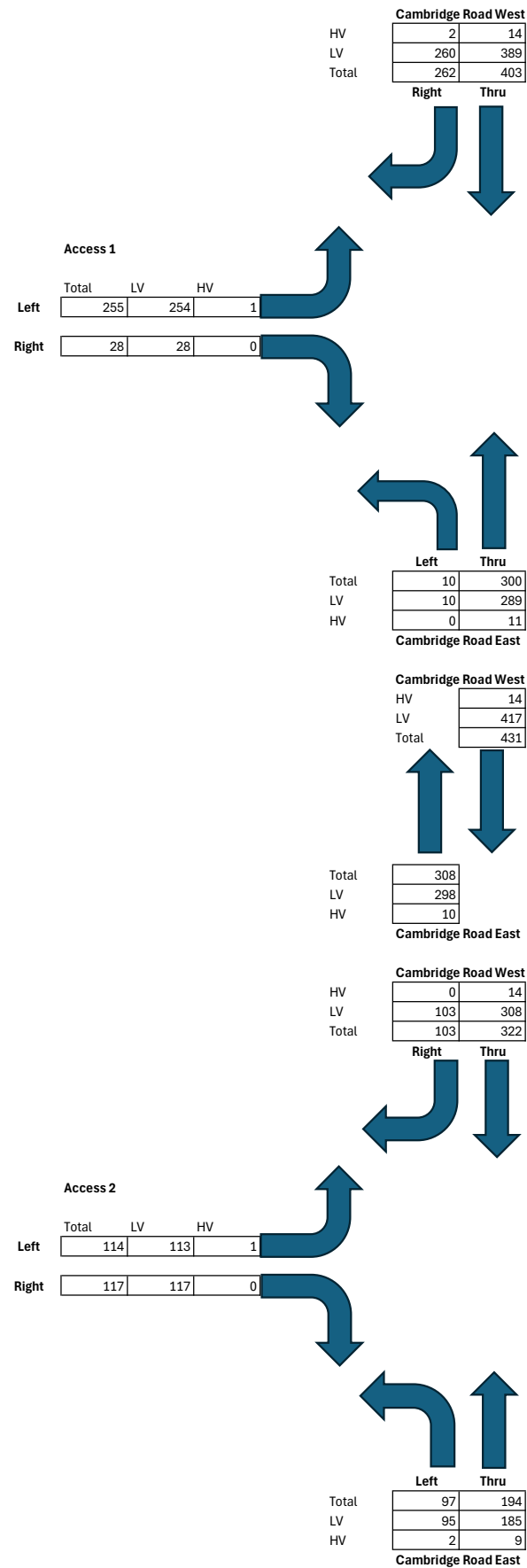


With Mitre 10 and 40% Growth in Thru Traffic

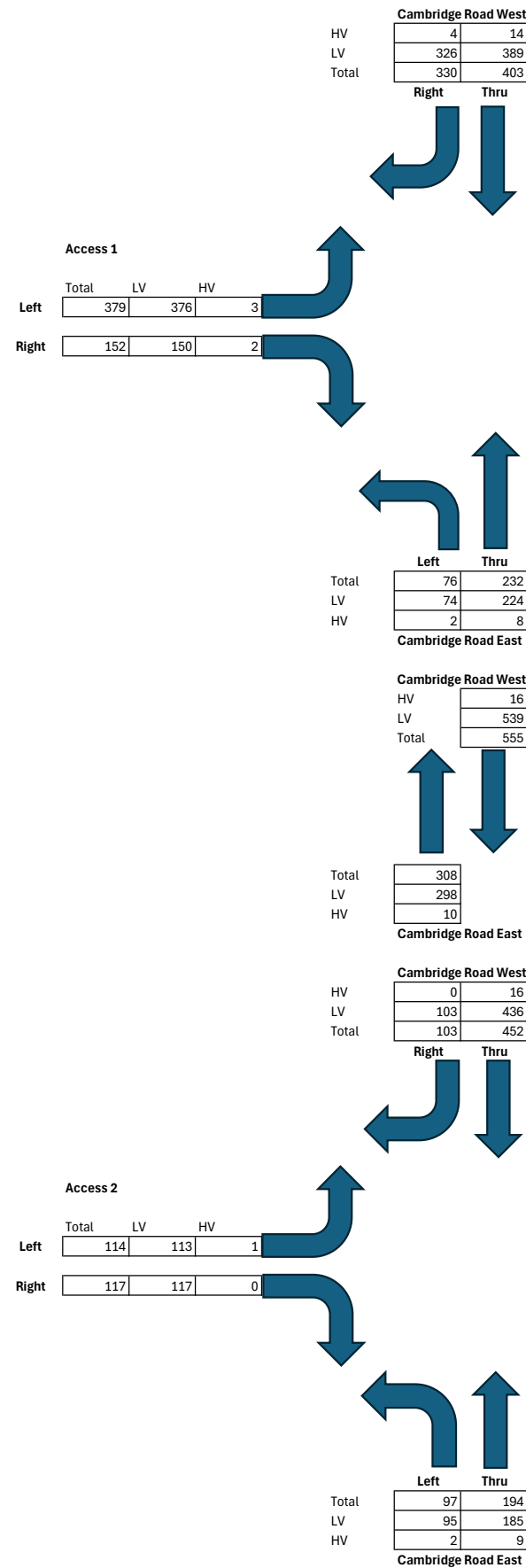


Traffic Assignments Process - PM Peak Hour

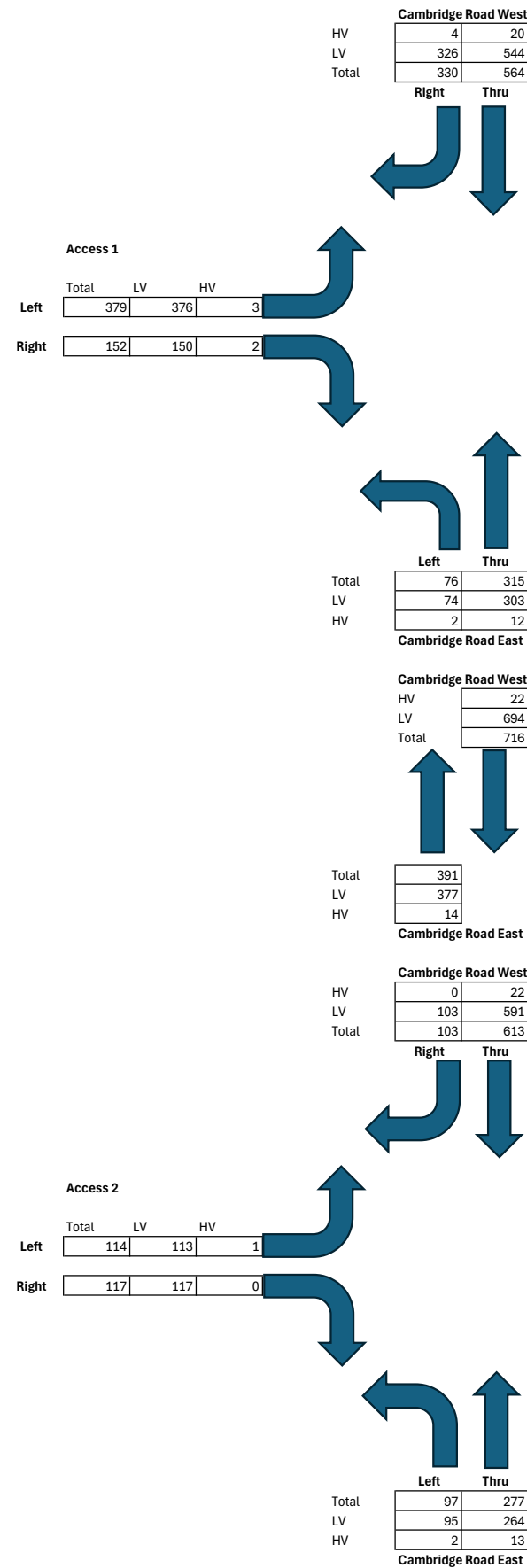
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With Proposed Mitre 10 Traffic

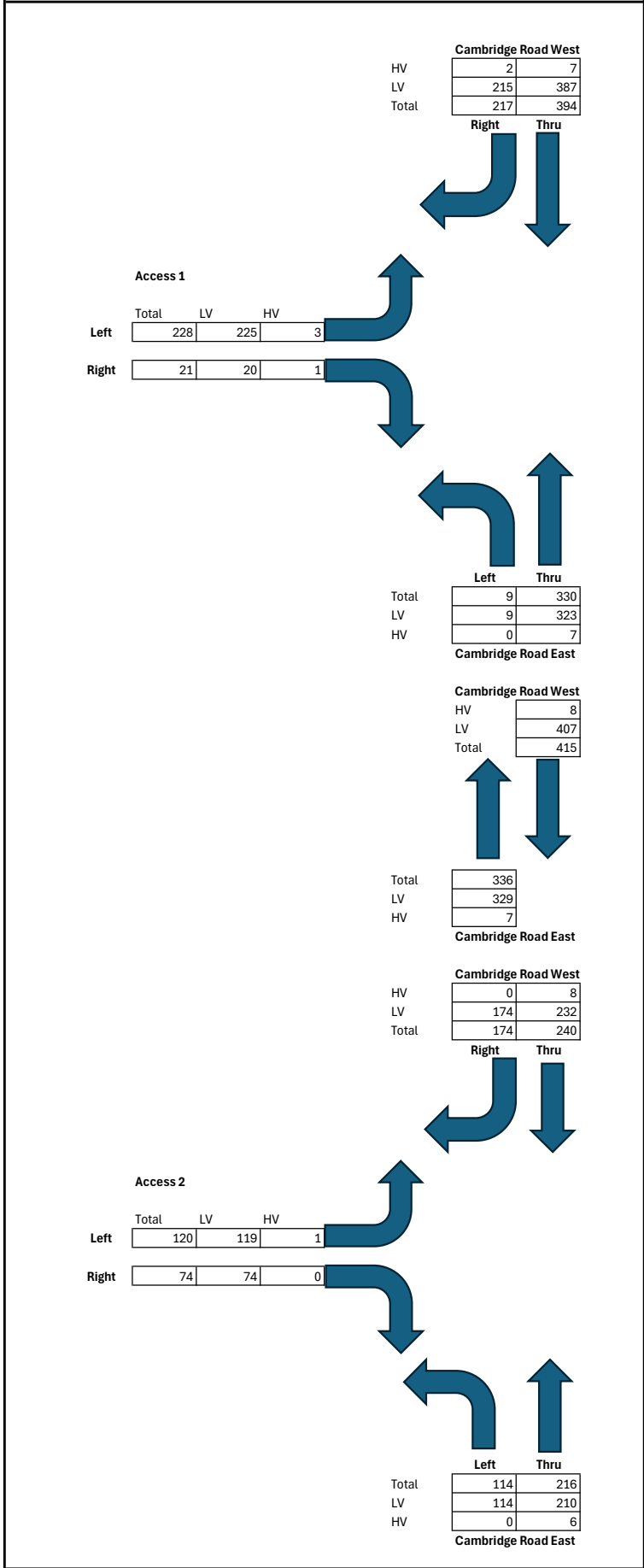


With Mitre 10 and 40% Growth in Thru Traffic

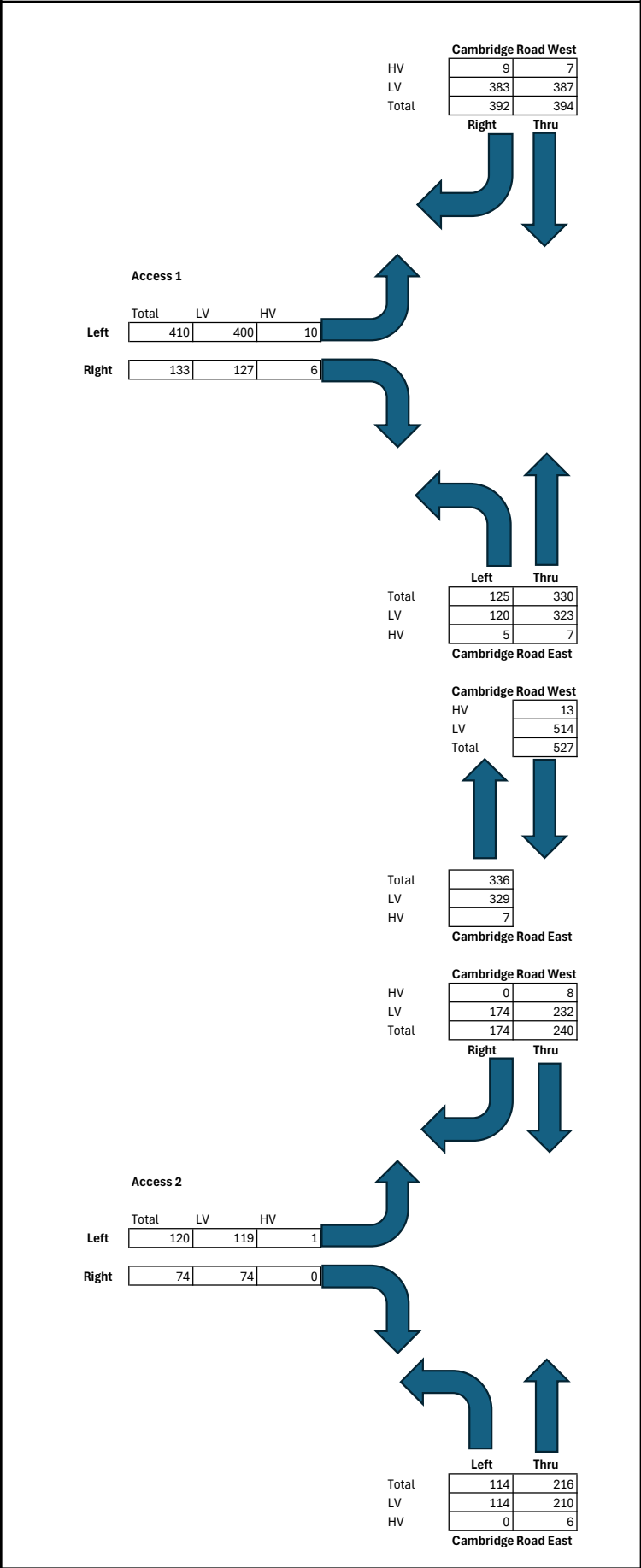


Traffic Assignments Process - Saturday Peak Hour	
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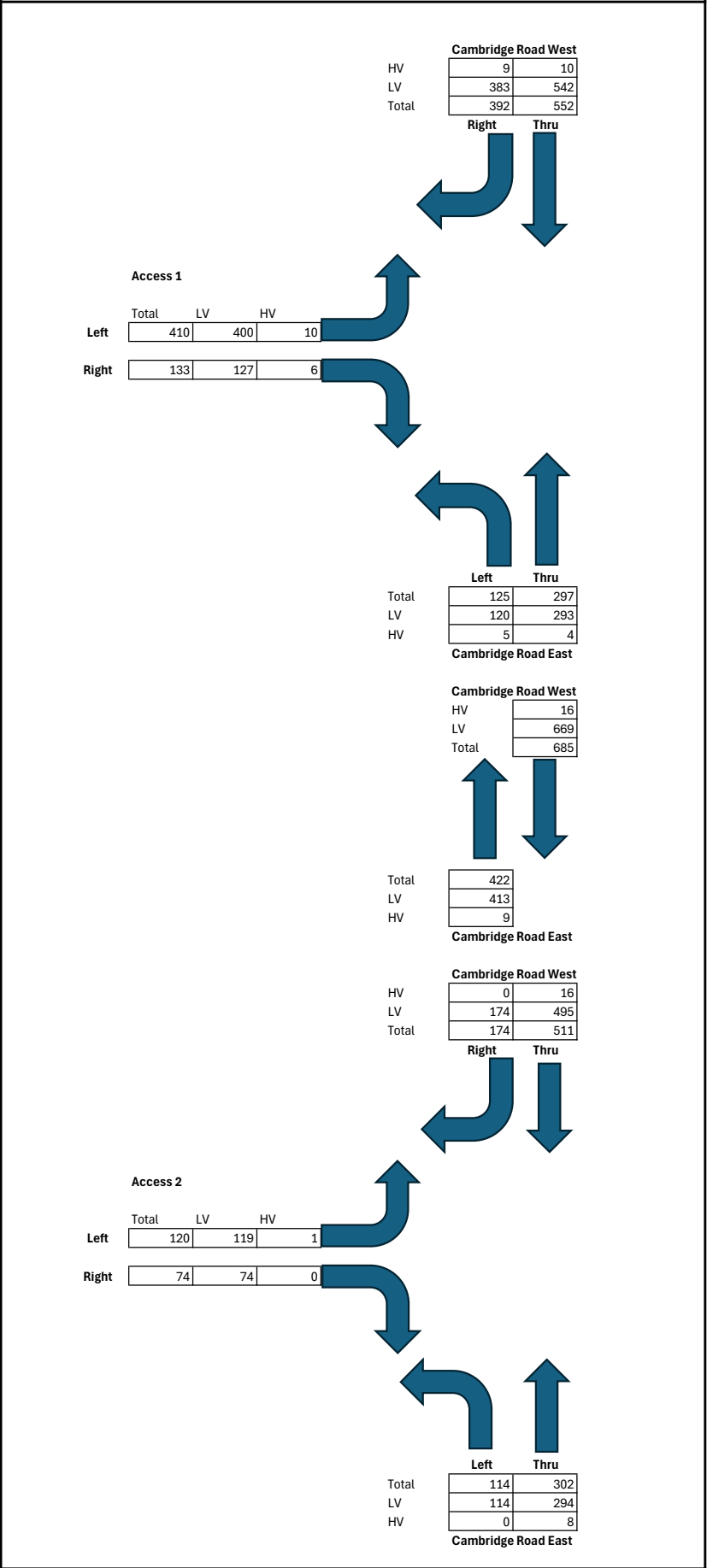
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With Mitre 10 and 40% Growth in Thru Traffic





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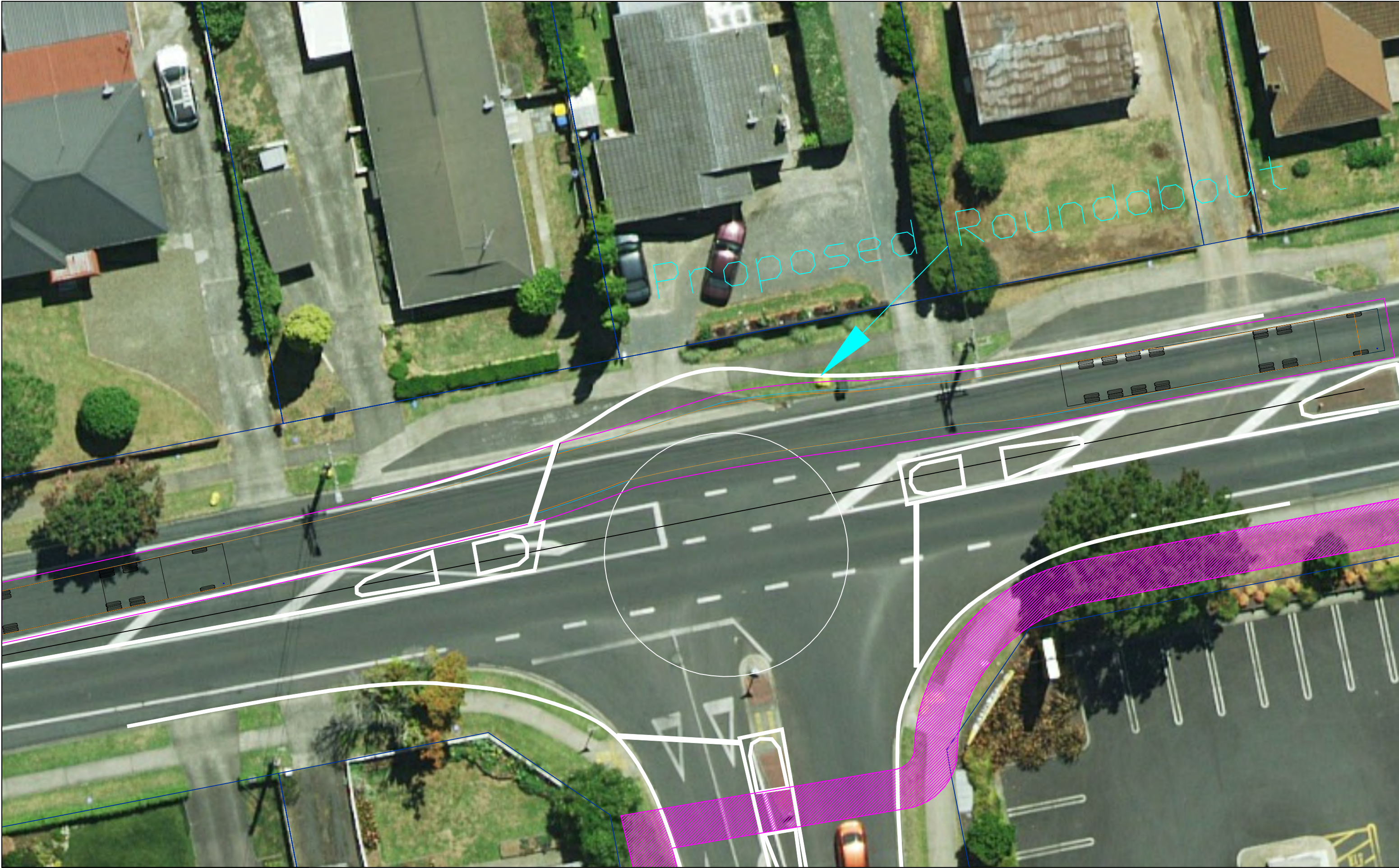
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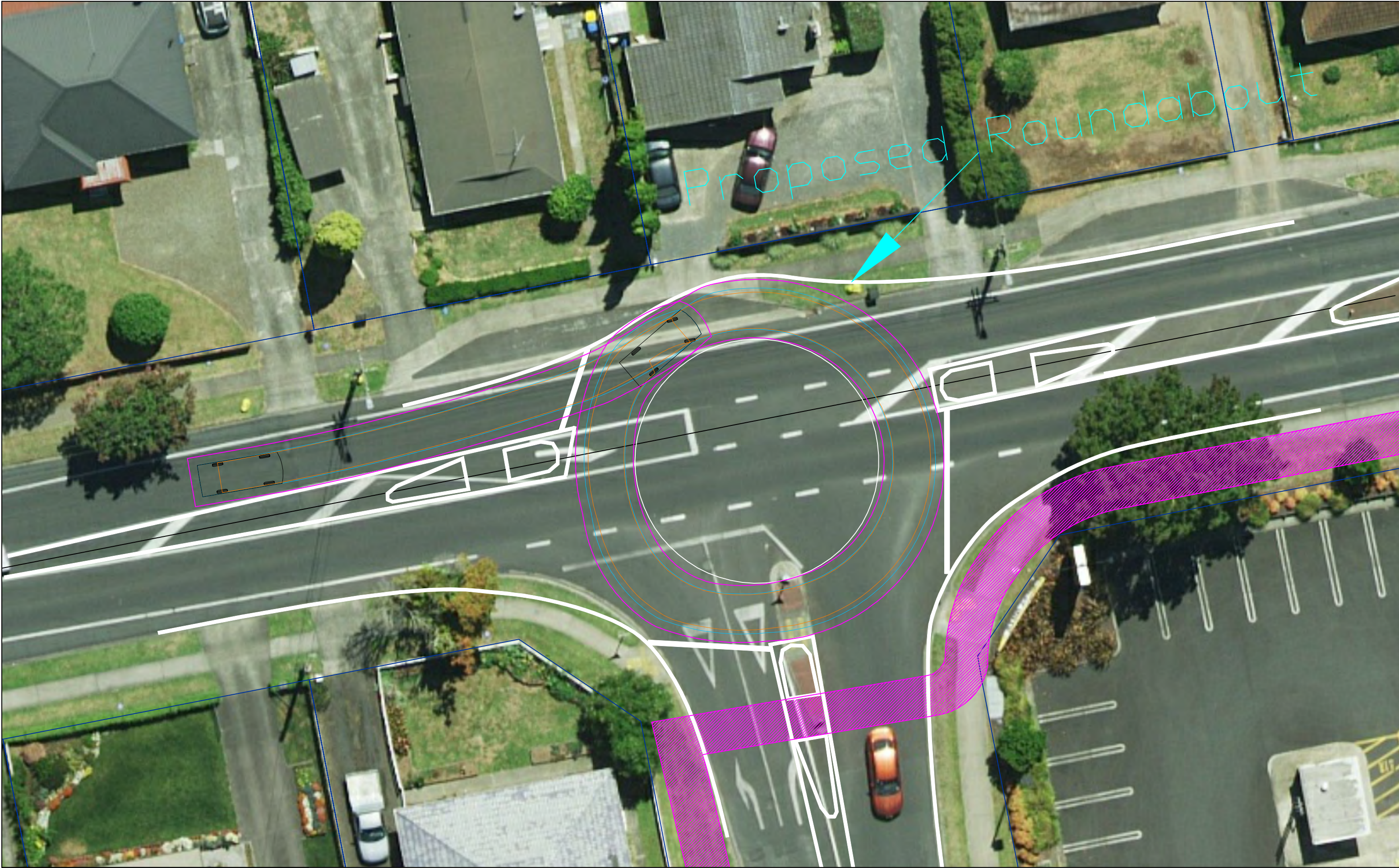
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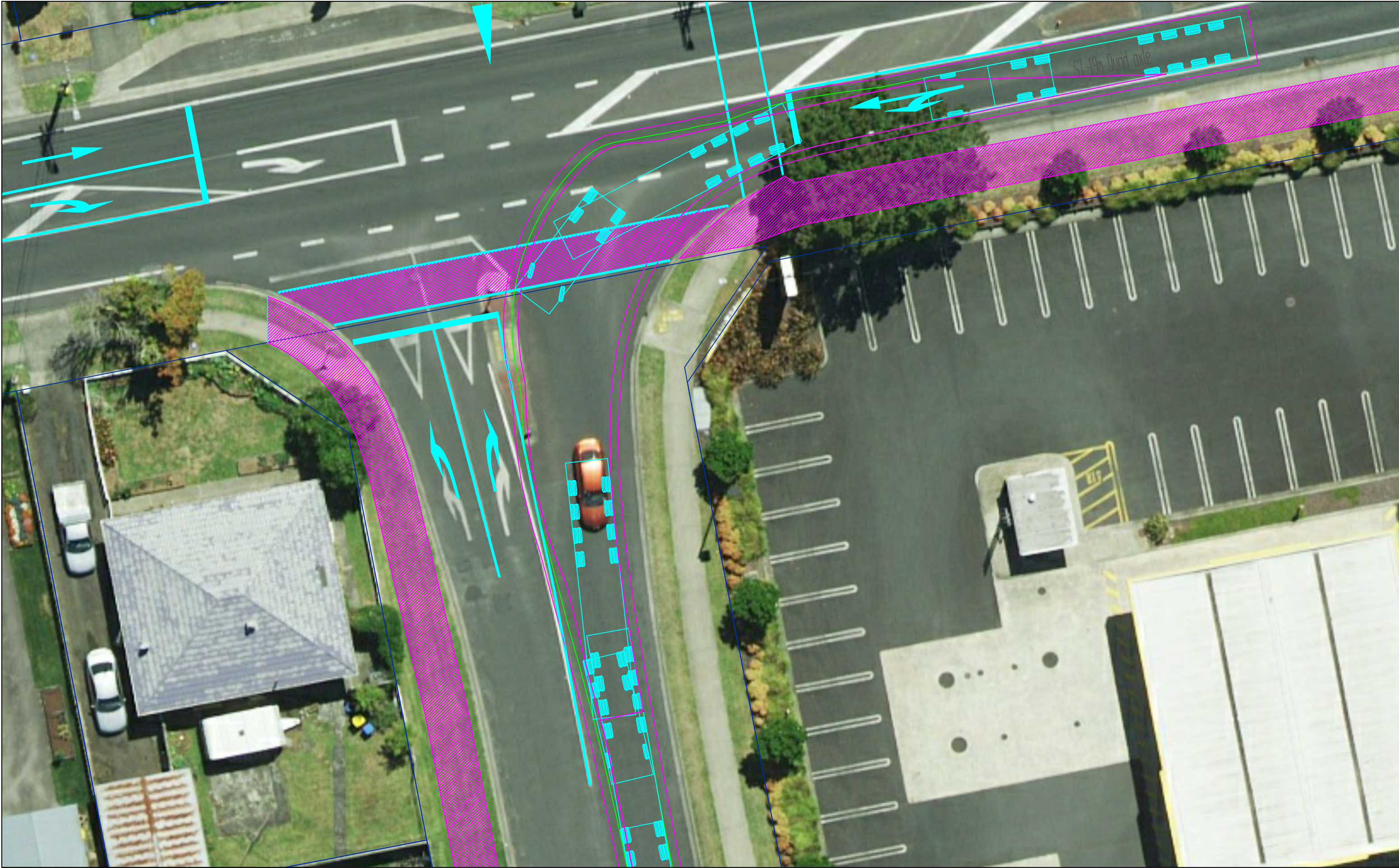
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